

1. LUEHEA Willd.

LUEHEA Willd., Gesells. Naturf. Freunde Berlin, Neue Schr. **3**: 410. 1801.

Alegria Moç. & Sesse ex DC., Prodr. **1**: 516. 1824.

Brotera Vell., Fl. Flum. 302. 1825, Fl. Flum. Ic. **7**: t.163-164. 1835.

Trees or tall shrubs, the trunk sometimes buttressed, the pubescence of stellate hairs. *Leaves* alternate, shortly petiolate, the stipules paired and mostly deciduous, the blade usually serrate, 3- to 5-palminerved. *Inflorescences* axillary or terminal, cymose or thyriform, sometimes flowers solitary. *Flowers* hermaphrodite, actinomorphic, pedicellate, bracteolate, calyculate, the bractlets 9-17, sometimes more or less long-connate at the base, mostly deciduous or rarely persistent; calyx valvate, the sepals 5, free or rarely shortly connate at the base, deciduous; petals 5, free, imbricate, longer than the sepals, glandular-thickened within at the base; stamens numerous, shortly 5- to 10-adelphous, the phalanges seldom united into a very short staminal tube, the outer stamens staminodial; anthers 2-theate, extrorse, more or less medifixus, versatile or seldom erect, longitudinally dehiscent; ovary superior, usually sessile, infrequently very short-stipitate, 5-celled, the cells many-ovulate; style simple, thick, somewhat enlarged near the apex; stigma capitate. *Capsules* ligneous, imperfectly loculicidally 5-valvate; seeds numerous, small, the testa crustaceous, expanded above into a large membranous wing; albumen carnose; embryo straight; cotyledons plane, foliaceous.

A neotropical genus of about 20 species; three species are found in Central America and Panama.

- a. Flowers solitary, large, 4.7-5.3 cm. long; bractlets 10-17, more or less long-connate at the base; capsule deeply 5-sulcate and prominently 5-angled, 6-7 cm. long 1. *L. CANDIDA*
- aa. Flowers in axillary or terminal panicles; bractlets 9, free.
 - b. Flowers ca. 3.2 cm. long; capsule more or less 5-angled, 3-3.5 cm. long 2. *L. SPECIOSA*
 - bb. Flowers ca. 1.3 cm. long; capsule deeply 5-sulcate and prominently 5-angled, 2-2.5 cm. long 3. *L. SEEMANNII*

- 1. LUEHEA CANDIDA (Moç. & Sesse ex DC.) Mart. & Zucc. in Mart., Nov. Gen. Sp. Pl. **1**: 102. 1826; Johnston, Sargentia **8**: 192. 1949.

Alegria candida Moç. & Sesse ex DC., Prodr. **1**: 517. 1824.

Luehea mexicana Spach, Hist. Nat. Veg. **4**: 42. 1835.

Luehea scabrifolia Presl, Epimeliae Botanicae 212. 1849.

Luehea endopogon Turcz., Bull. Soc. Imp. Nat. Moscou **31**(1): 225. 1858.

Luehea nobilis Linden & Planchon, Pl. Columb. 52. 1863.

Tree, small, or sometimes large shrub, 5-20 m. high, deciduous, the trunk attaining 25-30 cm. in diam., the crown broad, the branchlets ferruginous-arachnoid. *Leaves* thick-petiolate, the petiole 0.6-1 cm. long, tomentellous, the stipules elliptic, long-acuminate, up to 1.4-2 cm. long and villous-puberulous especially without, the blade broadly elliptic, more or less rounded and sometimes somewhat cordate at the base, acuminate at the apex, 8-22 cm. long and 6-16 cm. wide, the margins

coarsely or finely serrate, green and sparsely scabrous above, grayish or whitish and more or less densely arachnoid beneath, 3-palminerved, the nervation prominent especially beneath. *Flowers* solitary (sometimes geminate?), large, 4.7-5.3 cm. long, the pedicel terete, enlarged at the apex, 1-2 cm. long, tomentellous; bractlets 10-17, more or less long-connate at the base, narrowly oblong-lanceolate, dorsal-carinate, long-acuminate, up to 3.3-4.5 cm. long and 0.5 cm. wide, fleshy, tomentellous without, densely sericeous within, persistent; sepals oblong-lanceolate, shortly connate at the base, acute at the apex, up to 4.2-4.6 cm. long and 1.25 cm. wide, fleshy, tomentellous outside, glabrous inside except the sericeous base; petals spatulate-obovate, acuminate or acute, up to 4.7-5.3 cm. long and 2.5-3 cm. wide, white or cream-colored, glabrous except the hirsute base; stamens shortly 5-adelphous, the phalanges connate into a very short staminal tube, sericeous to hirsute on the lower part; anthers oblong, ca. 2.5 mm. long; ovary shortly stipitate, the gynophore ca. 1 mm. long, ovoid, deeply 5-sulcate, ca. 0.5 cm. long and 0.55 cm. in diam., densely sericeous; style ca. 1.8 cm. long, tomentellous; stigma capitate, obscurely 5-lobulate. *Capsule* very ligneous, deeply 5-sulcate and prominently 5-angled, rounded at the base, acute at the apex, 6-7 cm. long and ca. 3.5 cm. in diam., tomentellous when young to glabrate when mature; seeds more or less elliptic, flattened, ca. 6 mm. long and 3 mm. wide, the wing 15 mm. long and 6 mm. wide.

Along the Pacific slope from Mexico to Panama, northern Colombia and Venezuela; mostly on dry, thin soils on woody or brushy hillsides, sometimes along stream beds.

COCLÉ: between Aguadulce and Antón, ca. 15-50 m., *Woodson, Allen & Seibert 1203*. LOS SANTOS: Los Santos, *Dwyer 1185*. PANAMA: San José Island, *Erlanson 455, 463, Johnston 153*.

2. *LUEHEA SPECIOSA* Willd., *Gesells. Naturf. Freunde Berlin, Neue Schr.* **3**: 410, *t.5.* 1801.

Luehea platypetala A. Rich., *Bot., Pl. Vasc. in Ramon de la Sagra, Hist. Phys. Pol. Nat. Cuba* 212. 1845, *t.23* 1850(?).

Luehea ferruginea Turcz., *Bull. Soc. Imp. Nat. Moscou* **31**(1): 224. 1958.

Tree, medium-sized, sometimes shrub, 5-18(-20) m. high, deciduous, the trunk attaining 50 cm. in diam., the crown spreading, the branchlets ferruginous-puberulous. *Leaves* thick-petiolate, the petiole 1-1.2 cm. long, densely arachnoid, the blade elliptic, sometimes narrowly elliptic, rounded to more or less cordate and slightly asymmetric at the base, acuminate at the apex, 10-18 cm. long and 4.3-11 cm. wide, subcoriaceous, the margins coarsely serrate, green and sparsely scabrous above, whitish or grayish and loosely arachnoid beneath, 3-palminerved, the nervation prominent beneath. *Inflorescences* in axillary or terminal panicles. *Flowers* ca. 3.2 cm. long, the pedicel terete, 1.5-3.5 cm. long, shortly tomentellous; bractlets 9(-10), free, narrowly oblong-lanceolate, acute, 1.8-2 cm. long and 0.35-0.4 cm. wide, fleshy, shortly tomentellous on both sides, deciduous; sepals free, oblong-lanceolate, acute, ca. 2.9 cm. long and 0.75-0.9 cm. wide, fleshy, shortly tomentellous without, glabrous within; petals obovate, rounded, 3.1-3.2 cm.

long and 1.1-1.3 cm. wide, glabrous except the inner villous base; stamens shortly 5-adelphous, hirsute on the lower part, the staminodes ca. 10 mm. long and connate at the base; anthers ca. 1 mm. long; ovary sessile, oblong-ovoid, slightly 5-sulcate, ca. 0.6 cm. long and 0.4 cm. in diam., densely sericeous; style ca. 1.5 cm. long, more or less tomentellous on the lower part; stigma capitate. *Capsule* hard-ligneous, oblong, more or less 5-angled, rounded at the base, obtuse at the apex, 3-3.5 cm. long and 1.2-1.6 cm. in diam., tomentose; seeds ellipsoid, flattened, ca. 4-5 mm. long and 2-2.5 mm. in diam., the wing ca. 5 mm. long and 4 mm. wide.

Tropical Central America, Cuba, Colombia and Brazil; in open sunlight, on edges of pastures, in dry or sometimes more or less moist thickets and forests.

CANAL ZONE: around Culebra, alt. 50-150 m., *Pittier* 2141, 4811; Chiva-Chiva trail, Red Tank to Pueblo Nuevo, *Piper* 5717; Balboa, *Johansen* 4, *Standley* 25583, 26986; Balboa, near the Baptist Church, *Harvey* 5025; Ancon Hill, J.M. & M.T. *Greenman* 5086; Hospital Grounds at Ancon, 20-30 m., *Pittier* 2731; vicinity of Miraflores, P. & G. *White* 58; drowned forest of Quebrada Bonita and along its branches, 70-80 m., *Dodge*, *Steyermark* & *Allen* 17174; locality unknown, *Harvey* 5139. COCLÉ: Penonomé and vicinity, R.S. *Williams* 209, 1153. COLÓN: between France Field, Canal Zone and Catival, *Standley* 30412. HERRERA: vicinity of Ocu, 100 m., *Allen* 4093. PANAMA: near Panama, *Sargent* 23; Río Tapía, *Standley* 28080; along road between Panama and Chepo, *Dodge*, *Hunter*, *Steyermark* & *Allen* 16642; Taboga Island, Bro. *Celestine* 39, *MacBride* 2828; San José Island, *Johnston* 1283.

3. LUEHEA SEEMANNII Triana & Planchon, Ann. Sci. Nat., Bot., ser. 4, **17**: 348. 1862; Johnston, *Sargentia* **8**: 193. 1949.—Fig. 1.

Tree, tall, commonly 15-30 m. high or even more, evergreen, the trunk attaining 2 m. in diam., often strongly buttressed, the buttresses up to 2 m. in height, the branchlets tomentose. *Leaves* rather thick-petiolate, the petiole 0.8-1.3 cm. long and ca. 0.2-0.3 cm. in diam., tomentellous, the blade oblong or oblong-elliptic, sometimes slightly oblong-obovate, rounded and asymmetric at the base, acuminate at the apex, 7-40 cm. long and 3-15.5 cm. wide, subcoriaceous, the margins irregularly and acutely serrate especially above the middle, green and loosely arachnoid to glabrescent above, brownish-arachnoid beneath, 3(-4)-palm-nerved, the nervation prominent beneath. *Inflorescences* of axillary or terminal thyrses. *Flowers* rather small, ca. 1.3 cm. long, the pedicel 0.9-1.2 cm. long and shortly tomentellous; bractlets 9, free, narrowly elliptic, acute, ca. 7 mm. long and 1.25-2 mm. wide, fleshy, shortly tomentellous on both sides, deciduous; sepals free, oblong-lanceolate, acute, ca. 11 mm. long and 3.5 mm. wide, fleshy, shortly tomentellous without, glabrous within; petals spatulate, ca. 13 mm. long and 4.5 mm. wide, white or yellow, glabrous except the inner minutely hirsute base; stamens 5-adelphous, the phalanges ca. 9 mm. long, the united base of each phalanx ca. 2-2.5 mm. long and shortly tomentellous; anthers ca. 1 mm. long; ovary sessile, pyriform, deeply 5-sulcate, ca. 4.5 mm. long and 3.5 mm. in diam., densely sericeous; style ca. 5 mm. long, shortly tomentellous; stigma capitate and obscurely 5-lobulate. *Capsule* ligneous, narrowly elliptic, contracted towards both ends, deeply 5-sulcate and with 5 prominent angles, 2-2.5 cm. long and ca. 1 cm. in diam., shortly brownish-tomentellous; seeds more or less oblong, ca. 2.5-3 mm. long and 1 mm. wide, the wing ca. 8 mm. long and 3 mm. wide.



Figure 1. *LUEHEA SEEMANNII* Triana & Planchon: A, flowering branch ($\times \frac{1}{2}$); B, flower-bud ($\times 3$); C, flower ($\times 1\frac{1}{2}$); D, gynoecium ($\times 3$); E, cross-section of ovary ($\times 3$); F, capsule ($\times 1$); G, seed ($\times 2$).

A giant tree dispersed throughout tropical Central America and in Colombia; common in wet lowland forests along streams.

BOCAS DEL TORO: region of Almirante, *Cooper 19a*; Changuinola Valley, *Cooper & Slater 19*, *Dunlap 47*; Isla Colón, *von Wedel 40*; Old Bank Island, vicinity of Chiriquí Lagoon, *von Wedel 1967*. CANAL ZONE: along banks of Quebrada Fea, Q. Pura and Cañon of River Chagres, 70-100 m., *Dodge & Allen 17407*; Gatun, *Hayes 467*, 819, *Ostenfeld 56*; near Gatun, *Goldman 1862*; along the Chagres River below Gatun, near sea level, *Pittier 2812*; Barro Colorado Island, *Bangham 380*, *Brown 64*, 183, *Shattuck 745*, *Wetmore & Abbe 152*, *Wilson 18*, *Woodworth & Vestal 336*, 446, 513; Río Grande, near Culebra, alt. 50-100 m., *Pittier 2523*; near Miraflores, J.M. & M.T. *Greenman 5175*; vicinity of Río Cocoli, Road K-9, *Stern*, *Chambers*, *Dwyer*, *Ebinger 34*; vicinity of Corozal, *Piper 5300*; Curundu, *Harvey 5231*; Hospital Grounds at Ancon, alt. 20-30 m., *Pittier 2732*. COLÓN: between France Field, Canal Zone and Catival, *Standley 30360*; Río Gatuncillo, vicinity of Santa Rosa, alt. 25 m., *Allen 4157*. DARIEN: Marraganti and vicinity, R. S. *Williams 635*; vicinity of Pinogana, 20 m., *Allen 4291*; vicinity of El Real, Río Tuira, on trail between El Real and Pinogana, *Stern*, *Chambers*, *Dwyer*, *Ebinger 283*. HERRERA: vicinity of Ocu, 100 m., *Allen 4095*. PANAMA: vicinity of Arraijan, *Allen 1626*; Agricultural Experiment Station at Matias Hernández, *Pittier 6928*; Juan Díaz, *Standley 30560*; near Chepo, *Kluge 24*; San José Island, *Johnston 506*, 633, 1222, 1380. VERAGUAS: locality unknown, *Seemann s.n.* (type). PROVINCE UNKNOWN: *Hayes 978*, 1031.

2. TRICHOSPERMUM Blume

TRICHOSPERMUM Blume, *Bijdr. Fl. Ned. Ind.* 56. 1825.

Eroteum Blanco, *Fl. Filip.* ed. 1, 440. 1837.

Belotia A. Rich., *Bot., Pl. Vasc.* in Ramon de la Sagra, *Hist. Phys. Pol. Nat. Cuba* 207. 1845.

Diclidocarpus A. Gray, *Bot., Phanerog.* in U. S. Expl. Exped., 1838-42, **15**: 200. 1854.

Bixagrewia Kurz, *Jour. Bot.* **13**: 325. 1875.

Halconia Merrill, *Philipp. Jour. Sci.* **2**: 281. 1907.

Trees, the pubescence of stellate hairs. *Leaves* alternate, petiolate, stipulate, the stipules large and deciduous, the blade entire or serrate to serrulate, 3-palm-ined. *Inflorescences* unisexual or androgynous, of axillary or terminal panicles or umbelliform cymes. *Flowers* imperfect, actinomorphic, pedicellate, bracteolate, the bractlets caducous, (4-)5-merous; calyx valvate, the sepals free; petals free, imbricate, somewhat shorter than the sepals, glandular-thickened within at the base, rounded to more or less lobulate at the apex; gonophore naked, crowned by an undulate and densely velutinous urceolus surrounding the base of the stamens; stamens numerous, staminodial in the female flowers, the filaments free; anthers 2-thecate, introrse, medifixus, longitudinally dehiscent; ovary superior, sessile, 2(-3)-celled, rudimentary in the male flowers, the cells many-ovulate; style simple, obsolete in the male flowers; stigma bilobulate. *Capsules* coriaceous, compressed contrary to the partition, the margins sometimes expanded into a small wing, loculicidally 2(-3)-valvate, the cells many-seeded; seeds rather small, broadly ellipsoid, somewhat flattened, long-ciliate along the margins; albumen copious; embryo straight; cotyledons flat.

A tropical genus of America and Asia. Only one of the three American species is reported from Panama.

In a recent paper, Kostermans (*Reinwardtia* **6**: 277-279. 1962), discussing the affinities of the American genus *Belotia* and the Asiatic *Trichospermum*, concludes that they are congeneric and I agree with this opinion (for details, see the publication cited above).

Sprague (*Kew Bull.* 1921: 270-278. 1921), in a revision of the American species of the genus (under the name of *Belotia*), recognized eleven species based principally on very variable characters, such as the form and the pubescence of the leaves. Later, Bullock (*Kew Bull.* 1939: 517-521. 1939) reduced the number of American species to seven. My study of the Panamanian material has caused me to reduce further the number of these species to three, namely: *T. grewiaefolium* (A. Rich.) Kosterm. [syn. *Belotia Lessertiana* Hochr., *T. caribaeum* (Sprague) Kosterm., *B. Campbellii* Sprague and *T. tabascanum* (Sprague) Kosterm.], *T. mexicanum* (DC.) Baill. and probably *T. insigne* (Baill.) Kosterm.; this was originally suggested by Standley and Steyermark in the *Flora of Guatemala* (*Fieldiana: Bot.* **24**(6): 305. 1949).

1. *TRICHOSPERMUM MEXICANUM* (DC.) Baill., *Hist. Pl.* **4**: 179. 1873.—Fig. 2.

Grewia mexicana DC., *Prodr.* **1**: 510. 1824.

Belotia Galeottii Turcz., *Bull. Soc. Imp. Nat. Moscou* **19**(2): 504. 1846.

Belotia mexicana (DC.) K. Schum. in Engl. & Prantl, *Nat. Pflanzenfam.* **3**(6): 28. 1890.

Belotia panamensis Pittier, *Repert. Sp. Nov.* **13**: 313. 1914.

Belotia macrantha Sprague, *Kew Bull.* 1921: 274. 1921.

Belotia grandifolia Sprague, loc. cit. 275. 1921.

Belotia reticulata Sprague, loc. cit. 277. 1921.

Belotia australis Little, *Jour. Wash. Acad. Sci.* **38**: 99, fig. 1. 1948.

Belotia colombiana Cuatr., *Rev. Acad. Colomb. Cienc.* **8**: 480. 1952.

Belotia occidentalis Cuatr., loc. cit. 481. 1952.

Trichospermum australis (Little) Kosterm., *Reinwardtia* **6**: 278. 1962.

Trichospermum colombianum (Cuatr.) Kosterm., loc. cit. 278. 1962.

Trichospermum Galeottii (Turcz.) Kosterm., loc. cit. 278. 1962.

Trichospermum grandifolium (Sprague) Kosterm., loc. cit. 279. 1962.

Trichospermum macranthum (Sprague) Kosterm., loc. cit. 279. 1962.

Trichospermum occidentalis (Cuatr.) Kosterm., loc. cit. 279. 1962.

Trichospermum reticulatum (Sprague) Kosterm., loc. cit. 279. 1962.

Tree, 6-15(-27) m. high, the trunk 18-50 cm. in diam., the bark smooth, grayish, the branches spreading, arachnoid to puberulous. *Leaves* with terete petioles (0.8-)1-2.2 cm. long, puberulous to tomentose, the blade oblong or oblong-lanceolate or oblong-obovate, rounded or obtuse at the base, long-acuminate at the apex, 7-20 cm. long and 2.5-9 cm. wide, chartaceous to subcoriaceous, discolor, the margins remotely serrulate, the upper surface scatteringly short-puberulous, the lower surface spreading-puberulous or appressed-puberulous to tomentellous or with both tiers of hairs, often with long hirsute stellate hairs at the base of the 3 main nerves and in the axils of the lateral nerves, the secondary nervation reticulate and prominent beneath. *Inflorescences* unisexual or androgynous, of axillary or terminal, many-flowered panicles, shorter than the leaves, the axes shortly tomentellous. *Flowers* with a pedicel 3-9 mm. long, the sepals narrowly oblong to narrowly oblong-lanceolate, acute and cucullate, 9.5-14 mm. long and 2.5-3.2 mm. wide, pinkish, 3- to 5-nerved, minutely puberulous to tomentellous outside, glabrous or

scatteringly puberulous inside; petals narrowly obovate-oblong to linear-oblong, rounded or emarginate or undulate to lobulate, 8-12 mm. long and 1-3 mm. wide, purplish, scatteringly puberulous with simple and stellate hairs without, velutinous around and above the gland within, the gland ca. 1 mm. in diam.; gonophore ca. 1.5-2 mm. long, glabrous, the urceolus ca. 3-4 mm. broad; stamens 15, the filaments

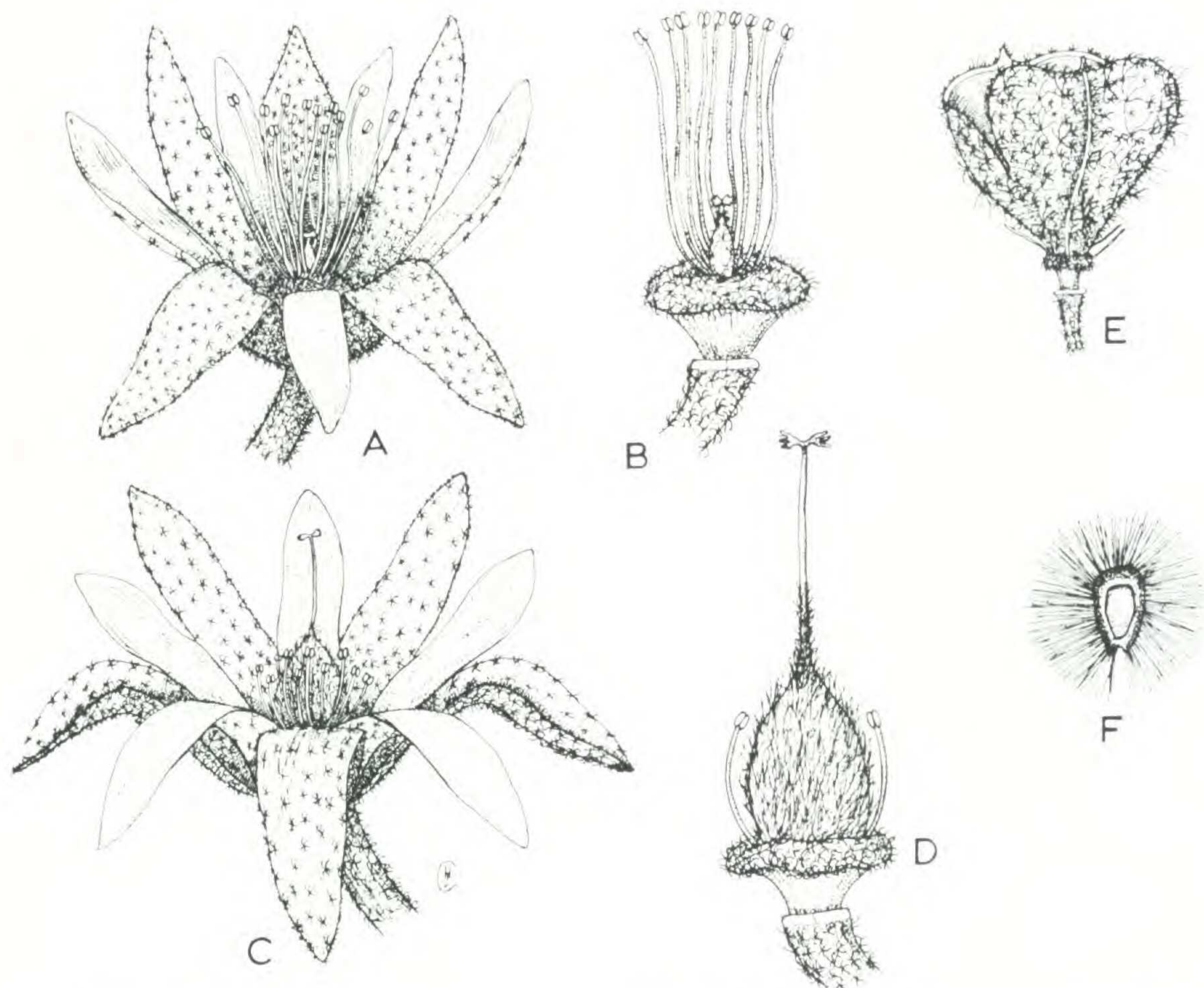


Figure 2. *TRICHOSPERMUM MEXICANUM* (DC.) Baill.: A, male flower ($\times 3$); B, id., calyx, corolla and some stamens removed ($\times 5$); C, female flower ($\times 3$); D, gynoecium and 2 sterile stamens ($\times 5$); E, capsule ($\times 1$); F, seed ($\times 2\frac{1}{2}$).

unequal, 5-9 mm. long and hirtellous near the base in the male flowers, much shorter and ca. 1.5-3 mm. in the female ones; anthers suborbicular, ca. 0.5 mm. long in the male flowers and ca. 0.2-0.3 mm. in the female ones; ovary of the male flowers very small, ovoid, ca. 1-1.5 mm. long and 0.75 mm. broad, more or less glabrous to villous at the base, the style obsolete, the stigma obscurely bilobulate and papillate; ovary of the female flowers pyriform, ca. 2.5-3 mm. long and 2.2-5 mm. broad, densely long-sericeous, the style filiform, 2.5-4 mm. long, puberulous near the base, the stigma bilobulate, the lobes spreading and densely laciniate. *Capsule* depressed-obovate, truncate or sometimes somewhat cordate and apiculate at the apex, 10-18 mm. long and 17-22 mm. wide, densely provided with 2 tiers of stellate hairs; seeds broadly ellipsoid, ca. 2.5 mm. in diam., long-ciliate along the margins, the hairs simple and ca. 2.5-3 mm. long.

From southern Mexico through Central America to Panama, Colombia and northern Ecuador, along the Pacific coast, chiefly in cutover forests.

CANAL ZONE: Gatun, *Ostenfeld* 82; Barro Colorado Island, *Brown* 54, 111, *Ebinger* 301, *Harvey* 5208, *Shattuck* 422, *Wetmore & Abbe* 57, *Wilson* 94, *Woodworth & Vestal* 344, 736; Las Cascadas Plantation, near Summit, *Standley* 25795, 29573; Valley of Masambi, on the road to Las Cascadas Plantation, alt. 20-100 m., *Pittier* 2584; Summit, *Lindsay* 295; Paraiso Station, *Hayes* 438; near junction K-6 road near Cocoli, *Dwyer* 5020; along an old trail above the Reservoir, 1 to 3 miles from Gorgona, alt. 40-150 m., *Maxon* 4736. CHIRIQUÍ: vicinity of Remedios, 0-150 m., *Allen* 3662. COCLÉ: El Valle de Antón, North Hills, *Allen* 3543. DARIEN: vicinity of Yaviza, along Río Chucunaque, El Punteadero, bridge on Inter-American Hwy., short distance from Yaviza, *Stern, Chambers, Dwyer, Ebinger* 146; Caná and vicinity, 2,000-6,500 ft. ele., *R. S. Williams* 772. PANAMA: Cerro Campana, *Allen* 2092; Arraijan, *P. & G. White* 64; along road between Balboa and Chame, *Dodge, Hunter, Steyermark & Allen* 16738; near Panama, *Sargent* 21; Pacora, *Killip* 3311; vicinity of Pacora, alt. ca. 35 m., *Allen* 1009; locality unknown, *Allen* 1127. SAN BLAS: Permé, *Cooper* 655.

3. GOETHALSIA Pittier

GOETHALSIA Pittier, Repert. Sp. Nov. **13**: 313. 1926.

Trees, tall, the trunk often buttressed, the pubescence generally of stellate hairs. *Leaves* alternate, short-petiolate, stipulate, the stipules small and deciduous, the blade serrate, 3-palminerved. *Inflorescences* of axillary or terminal, loose cymes. *Flowers* hermaphrodite, actinomorphic, pedicellate, calyculate, the bractlets 3, valvate, fleshy, caducous; calyx valvate, the sepals 5, free, fleshy; petals 5, free, imbricate, about half the length of the sepals, glandular-thickened within at the base; gonophore short, naked, crowned by a short, membranous urceolus surrounding the base of the stamens; stamens ca. 25, the filaments free, unequal; anthers 2-thecate, medifixus, longitudinally dehiscent; ovary superior, sessile, 3- or 4-celled, the cells 4-ovulate; style simple, filiform; stigma obscurely parted. *Fruit* composed of 3(-4) samaras separating at maturity from a central axis, each samara 1- to 4-seeded; seeds pyriform, flattened; albumen copious; embryo straight; cotyledons flat, foliaceous.

A neotropical, monotypic genus. Gleason (*Phytologia* **1**: 112. 1934) and Baehni (*Candollea* **6**: 44-45. 1935) have excluded the genus *Goethalsia* from the *Tiliaceae*, assigning it either to the *Flacourtiaceae* or to the *Bixaceae* sensu lato. These authors have based their interpretation chiefly on the placentation of the ovary which they erroneously interpreted as parietal! Weibel (*Candollea* **10**: 170. 1945) however, in studying the placentation of the *Tiliaceae*, decided to retain this genus in the family on the grounds that the ovary, while divided into 3 or 4 cells, still has incomplete fusion of the margins of the carpels.

1. GOETHALSIA MEIANTHA (J. D. Sm.) Burret, Notizbl. Bot. Gart. Mus. Berlin **9**: 815. 1926.—Fig. 3.

Luehea meiantha J. D. Sm., Bot. Gaz. **24**: 394. 1897.

Goethalsia isthmica Pittier, Repert. Sp. Nov. **13**: 314. 1914.

Tree 15-45 m. high, the trunk 0.35-1.5 m. in diam., often strongly buttressed, the young branchlets minutely puberulous. *Leaves* with a terete petiole 0.8-1.8 cm.

long, shortly tomentellous, the blade elliptic to oblong-elliptic, acute to rounded at the base, acuminate at the apex, 6.5-18 cm. long and 2.5-7 cm. wide, chartaceous, discolor, the margins remotely serrate, the upper surface green and sparsely puberulous, the lower surface pale, densely and minutely appressed-puberulous, the nervation prominent beneath. *Inflorescences* axillary or terminal, the cymes usually few-flowered, the axes shortly tomentellous. *Flowers* pale yellow, the pedicel ca. 8-9 mm. long, the bractlets ovate to broadly ovate, acute or obtuse at the apex, slightly unequal, ca. 6-6.5 mm. long and 3.5-4 mm. wide, shortly tomentellous without, densely and minutely villous within; sepals narrowly lanceolate, acuminate, ca. 13-14 mm. long and 2-2.5 mm. wide, densely and shortly arachnoid outside, long-arachnoid especially on the upper half inside; petals oblong to narrowly obovate, unguiculate and gibbose at the base, obtuse at the apex, 5-6 mm. long and 1.2-2 mm. wide, the claw cuneate, ca. 1.5-2 mm. long, entirely glandular-thickened within, densely villous above the claw, elsewhere papillate and with scattered long stellate hairs; gonophore ca. 1.5-1.8 mm. long, the urceolus ca. 2 mm. in diam., densely villous

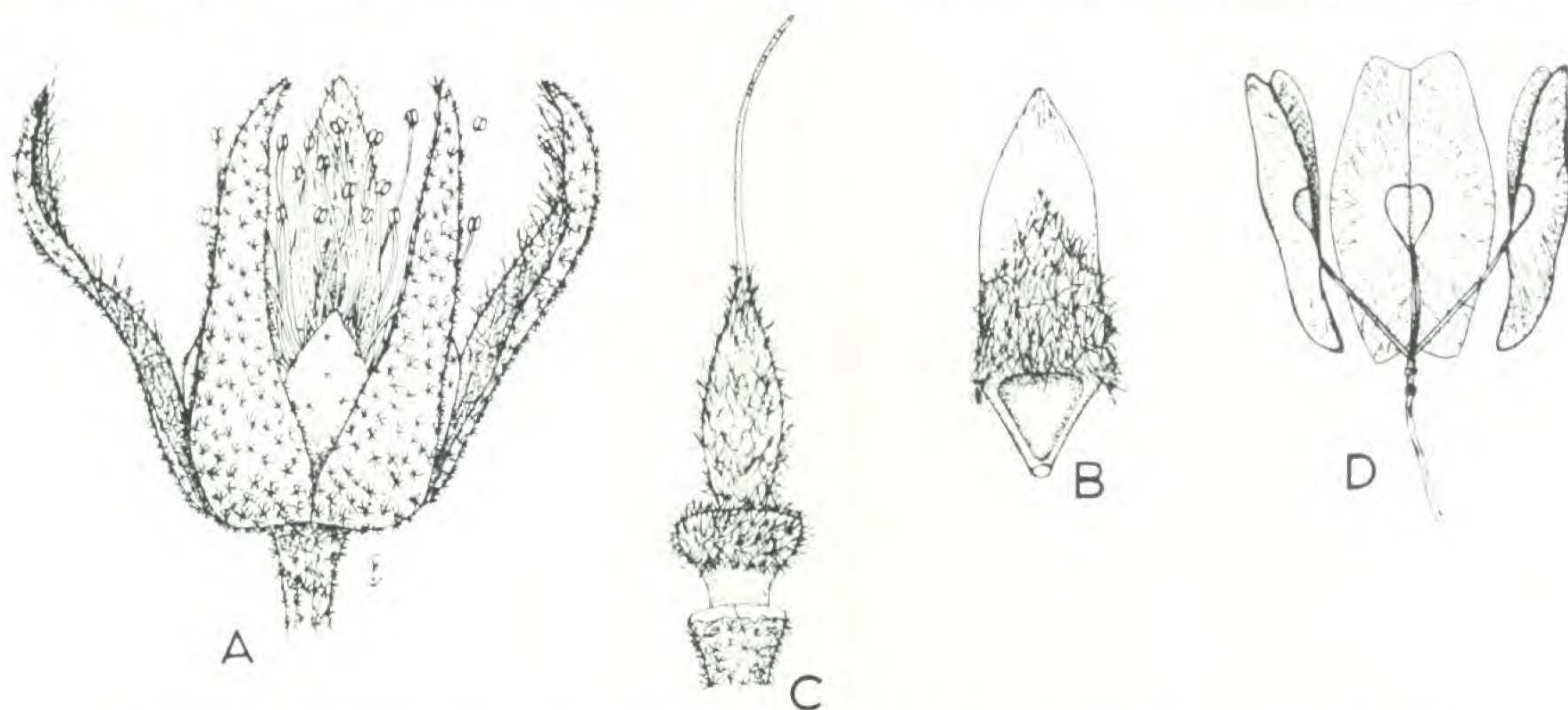


Figure 3. *GOETHALSIA MEIANTHA* (J. D. Sm.) Burret: A, flower ($\times 3$); B, petal from inside ($\times 5$); C, gonophore, urceolus and gynoecium ($\times 5$); D, samaras separating from the central axis ($\times \frac{1}{2}$).

except the base; stamens ca. 22-25, the filaments 5-7 mm. long and glabrous, the anthers ca. 0.5 mm. long; ovary ellipsoid, slightly 3-angled, ca. 2.5-3 mm. long and 1.5 mm. broad, densely appressed-villous; style ca. 3-5 mm. long, glabrous or slightly villous at the base; stigma obscurely 3-lobulate. *Samaras* broadly winged, the wings emarginate at both ends, 4-4.5 cm. long and ca. 2.2 cm. wide, puberulous to tomentellous on the outer surface; seeds ca. 2.8-4 mm. long and 1.8-2.5 mm. broad.

Costa Rica, Panama and Colombia (Boyaca); according to Allen (The rain forest of Golfo Dulce 210. 1956), *G. meiantha* is one of the most common and characteristic trees in the Golfo Dulce region in Costa Rica, where it occurs in old clearings and on the margins of the forests and occasionally in pastures; in Colombia (Gleason, *Phytologia* 1:112. 1934), it has been collected at 900 m. altitude in the western mountains of Boyaca.

CHIRIQUÍ: forest around Puerto Remedios, alt. 0-150 m., *Pittier* 5445 (type), *Allen* 3662; *Progreso, Cooper & Slater* 219.

4. CORCHORUS L.

CORCHORUS L., Sp. Pl. 529. 1753, Gen. Pl. ed. 5, 234. 1754.

Antichorus L., Syst. Nat. ed. 12, 2: 264. 1767, Mant. Pl. 9. 1767.

Carietaria Scop., Intr. Hist. Nat. 104. 1777.

Maerlensia Vell., Fl. Flum. 231. 1825.

Ganja Reichenb., Handb. Nat. Pflanzens. 303. 1837.

Herbs, undershrubs or shrubs, the pubescence of simple or stellate hairs. *Leaves* alternate, petiolate, 2-stipulate, the stipules small and bristle-like, the blade serrate, palminerved. *Flowers* small, oppositifolious or axillary, solitary or geminate or 3-nate, hermaphrodite, actinomorphic, pedicellate, bracteolate; calyx valvate, the sepals 4-5, free, deciduous; petals 4-5, free, generally imbricate, glandless; stamens numerous or rarely twice the number of the sepals, the filaments inserted on a short torus, free or more or less long-connate; anthers 2-thecate, introrse, medifixus, versatile, longitudinally dehiscent; ovary superior, sessile, 2- to 5-celled (1-celled in bud), each cell many-ovulate; style simple; stigma densely papillate. *Capsules* chartaceous to coriaceous, elongated, silique-like and smooth, or short, subglobose and muricate, loculicidally 2- to 5-valvate, sometimes internally transversely septate; seeds numerous, small, pendulous or horizontal, albuminous; embryo generally curved; cotyledons cordate, foliaceous.

A genus of about 30 species distributed throughout the tropics. Two asiatic species, *C. olitorius* L. and *C. capsularis* L., are cultivated in many tropical countries for the important fibre, jute. Only three species occur in Panama and one or two others grow in Central America.

- a. Ovary and capsule 2-celled.
 - b. Leaves hirsute on both sides; sepals long-hirsute without, glabrous within; capsule caudate-acuminate at the apex, ca. 3 cm. long, more or less densely long-hirsute; herb1. *C. HIRTUS*
 - bb. Leaves glabrous or nearly so on both sides; sepals glabrous; capsule acute with 4 minute teeth at the apex, 3.8-6 cm. long, inconspicuous puberulous; small shrub2. *C. SILIQUOSUS*
- aa. Ovary 3-celled; capsule 3-celled, long-caudate-acuminate at the apex, 3-6 cm. long, glabrous or nearly so3. *C. ORINOCENSIS*

1. CORCHORUS HIRTUS L., Sp. Pl. ed. 2, 747. 1762.—Fig. 4 (A-B).

Corchorus pilosus H. B. K., Nov. Gen. Sp. Pl. 5: 338. 1823, t. 487 (1822).

Maerlensia hirsuta Vell., Fl. Flum. 231. 1825, Fl. Flum. Ic. 5: t. 112. 1835.

Corchorus villosissimus St.-Hil., Juss. & Camb., Fl. Bras. Merid. 1: 217. 1827.

Corchorus humilis St.-Hil., Juss. & Camb., loc. cit. 218. 1827.

Corchorus hirtus var. *pilosus* K. Schum. in Mart., Fl. Bras. 12(3): 127. 1886.

Corchorus hirtus var. *brasiliensis* K. Schum. in Mart., loc. cit. 127. 1886.

Corchorus hirtus var. *villosissimus* (St.-Hil., Juss. & Camb.) K. Schum. f. *humilis* (St.-Hil., Juss. & Camb.) K. Schum. in Mart., loc. cit. 128. 1886.

Corchorus hirtus var. *villosissimus* f. *adscendens* K. Schum. in Mart., loc. cit. 128. 1886.

Corchorus hirtus var. *villosissimus* f. *Hilarianus* K. Schum. in Mart., loc. cit. 128. 1886.

Corchorus hirtus var. *Martii* K. Schum. in Mart., loc. cit. 128. 1886.

Herb, usually erect or sometimes spreading, the stem attaining 40-60 cm. or even more in height, sometimes somewhat woody below, branched or not, sparsely to densely hirsute, the hairs usually simple. *Leaves* short-petiolate, the petiole 3-5

mm. long, densely hirsute, the stipules linear-lanceolate, curved, acuminate, longer than the petioles, ca. 5-7 mm. long, hirsute; blade lanceolate to oblong-lanceolate or more or less ovate, acute at the apex, 1.5-4.3 cm. long and 0.7-2 cm. wide, herbaceous, the margins serrate-crenate, hirsute on both sides, 3-palminerved. *Flowers* oppositifolious (or sometimes axillary?), solitary or sometimes geminate,

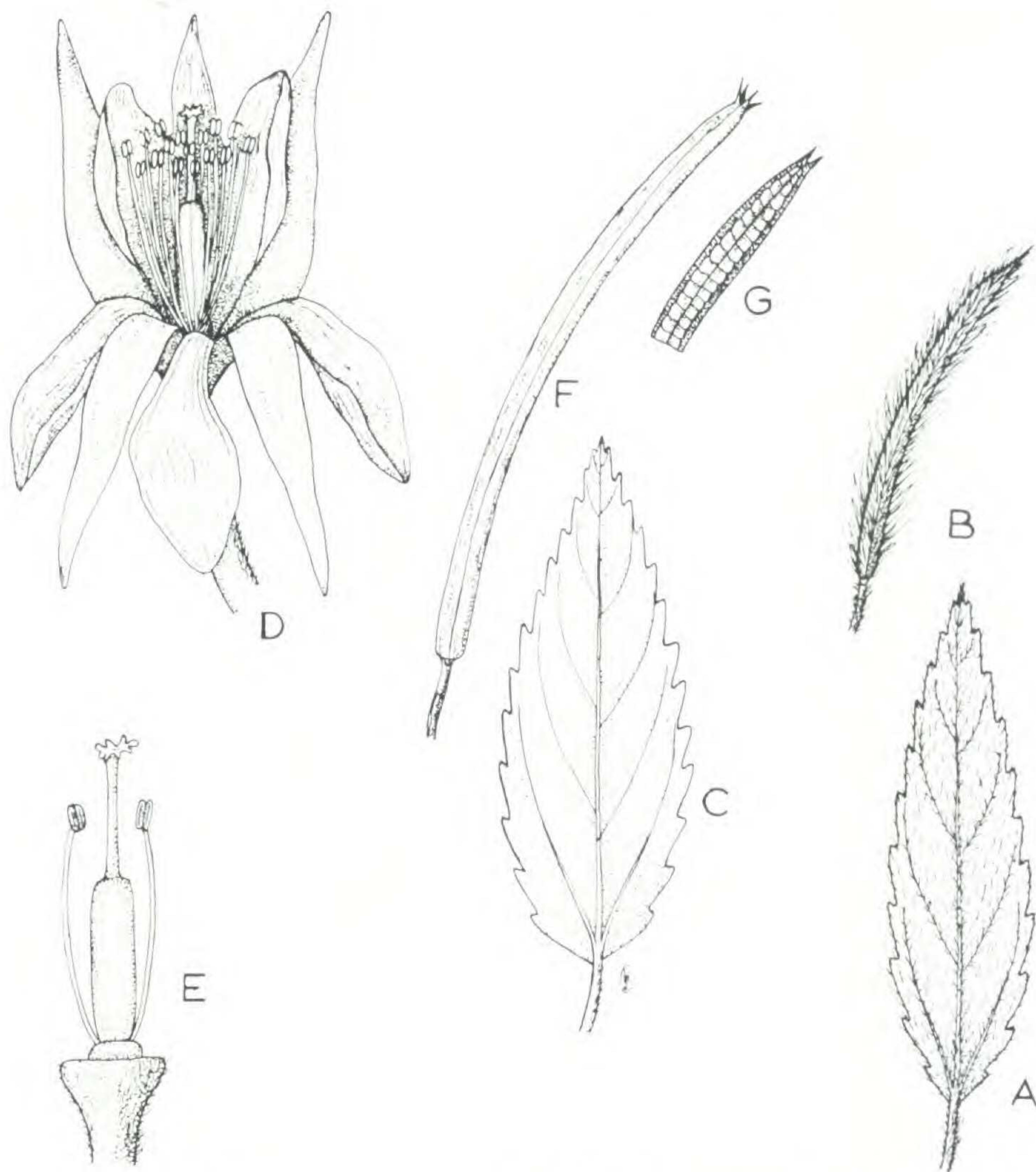


Figure 4. *CORCHORUS HIRTUS* L.: A, leaf, lower surface ($\times 1\frac{1}{2}$); B, capsule ($\times 1$). *CORCHORUS SILIQUOSUS* L.: C, leaf, lower surface ($\times 1\frac{1}{2}$); D, flower ($\times 4$); E, gynoecium and 2 stamens ($\times 5$); F, capsule ($\times 1$); G, longitudinal section of the upper part of the capsule ($\times 1$).

the pedicel longer than the petiole, ca. 4-10 mm. long, densely long-hirsute; sepals 5, linear, long-acuminate, 7.5-10 mm. long and 1-1.2 mm. wide, long-hirsute without, glabrous within; petals 5, spatulate, rounded, 7.5-9 mm. long and 2.5-3.5 mm. wide, yellow, glabrous; stamens numerous, the filaments free to more or less long-connate, ca. 7 mm. long, the anthers more or less reniform, ca. 0.5 mm. long; ovary narrowly oblong, compressed, ca. 2-2.5 mm. long and 0.5 mm. in diam., densely long-sericeous, 2-celled; style filiform, ca. 4 mm. long, glabrous; stigma peltate, subbilobulate, the lobes densely papillate. *Capsule* erect, linear, compressed contrary to the partition, caudate-acuminate at the apex, ca. 3 cm. long and 0.25 cm. in diam., 2-celled, the valves chartaceous and more or less densely long-hirsute; seeds numerous, polygonal, ca. 1 mm. long, the testa black.

A weedy species found throughout tropical America.

CANAL ZONE: Sosa Hill, Balboa, *Standley* 26445. HERRERA: Océ, *Ebinger* 1087. PANAMA: hills between Capira and Potrero, 80-130 m., *Dodge & Hunter* 8635; sabanas north of Panama City, *Bro. Paul* 532; Tocumen, *Dwyer* 2102.

2. *CORCHORUS SILIQUOSUS* L., Sp. Pl. 529. 1753; Johnston, *Sargentia* **8**: 192. 1949.—
Fig. 4 (C-G).

Corchorus orinocensis sensu Standley, *Contr. Arnold Arb.* **5**: 100. 1933.

Shrub usually 1 m. or less high, sometimes to 2 m. in height, the branchlets terete, smooth, glabrous except one of two longitudinally short-puberulous rows. *Leaves* petiolate, the petiole 0.5-2.8 cm. long, short-puberulous above, glabrous beneath, the stipules narrowly lanceolate, acuminate, ca. 2.5 mm. long, glabrous; blade ovate to more or less elliptic, rounded and somewhat cordate at the base, acute at the apex, 2-7 cm. long and 0.9-3.5 cm. wide, membranous, discolored, the margins crenate-serrate, glabrous or nearly so on both sides, usually 3-palmi-nerved. *Flowers* oppositifolious or axillary, solitary, geminate or 3-nate, short-pedicellate, the pedicel terete, enlarged at the apex, 4-8 mm. long, inconspicuous-puberulous; sepals 5, narrowly oblong-lanceolate, long-acuminate, 7-8 mm. long and 1-1.5 mm. wide, fleshy, glabrous; petals 5, obovate, rounded, 5-6 mm. long and 3 mm. wide, yellow, glabrous; stamens numerous, free, the filaments ca. 4-5 mm. long, the anthers oblong, ca. 0.5 mm. long; ovary narrowly oblong, ca. 3 mm. long and 0.75 mm. in diam., very shortly puberulous, 2-celled; style filiform, ca. 2.5 mm. long, glabrous; stigma subbilobate, densely papillate. *Capsule* erect, linear, compressed contrary to the partition, acute and with 4 minute teeth at the apex, 3.8-6 cm. long and 2-2.5 mm. in diam., 2-celled, the valves coriaceous-chartaceous, inconspicuously puberulous; seeds numerous, polygonal, ca. 1 mm. long.

A common, weedy shrub distributed throughout the American tropics and north to southern Florida.

BOCAS DEL TORO: Isla Colón, vicinity of Chiriquí Lagoon, *von Wedel* 2855. CANAL ZONE: vicinity of Fort Sherman, *Standley* 31137; Gatun, *Bro. Heriberto* 125; hills west of the Canal, near Gatun, *Standley* 27254; Barro Colorado Island, *Aviles* 12; Gamboa, *Standley* 28425; between Summit and Gamboa, *J.M. & M.T. Greenman* 5245; Las Cascadas Plantation, near Summit, *Standley* 25814; vicinity of Summit, *Standley* 30139; around Culebra, alt. 50-150 m., *Pittier* 4779; Río Paraiso, above East Paraiso, *Standley* 29903; along the old Las Cruces Trail, between Fort Clayton and Corozal, *Standley* 29210; Camino de Corozal, *Bro. Heriberto* 253; Ancon, *Bro. Celestine* 6, *Machride & Featherstone* 12; Balboa, *Standley* 27156; Sosa Hill, Balboa, *Standley* 26474; Colón to Empire, *Crawford* 430; around Tabernilla, along the railroad, alt. 20-25 m., *Pittier* 3817. COCLÉ: between Las Margaritas and El Valle, *Woodson, Allen & Seibert* 1238. COLÓN: vicinity of Gatuncillo, *Piper* 5629; locality unknown, *Kuntze s.n.* PANAMA: Río Potrero, ca. 2 mi. from Arraijan, *Duke* 4679; along the Corozal Road, near Panama, *Standley* 26774; Bella Vista, *Killip* 12006; Nuevo San Francisco, *Standley* 30719; near Matias Hernández, *Standley* 28938; between Matias Hernández and Juan Díaz, *Standley* 32052; Río Tapia, *Standley* 26208, 28274; Taboga Island, *Miller* 1958, *Standley* 27988; San José Island, *Erlanson* 196. PROVINCE UNKNOWN: *Seemann s.n.*

3. *CORCHORUS ORINOCENSIS* H. B. K., Nov. Gen. Sp. Pl. **5**: 337. 1823.

Corchorus hirtus L. var. *orinocensis* (H. B. K.) K. Schum. in Mart., Fl. Bras. **12**(3): 127. 1886.

Herb, erect, bushy, sometimes somewhat woody below, 0.30-1.2 m. high, the hairs usually simple, the stems glabrous except a row of hirsute-arachnoid hairs decurrent from the base of the petioles. *Leaves* rather long-petiolate, the petiole 0.7-1.6 cm. long, hirsute-arachnoid above and glabrous or nearly so beneath, the stipules subulate, shorter than the petioles, ca. 4-5 mm. long, ciliate; blade lanceolate to narrowly lanceolate, rounded at the base, acute to long-acuminate at the apex, 3-8 cm. long and 0.9-2.5 cm. wide, membranous, the margins irregularly serrate and ciliolate, glabrous or nearly so on both sides except along the hirtellous nerves, 5-palminerved, the nervation slightly prominent beneath. *Flowers* oppositifolious, generally geminate, the pedicel shorter than the petiole, ca. 3-5 mm. long, hirsute-arachnoid; sepals 5, narrowly linear, long-acuminate, 7.5-9.5 mm. long and 1-1.5 mm. wide, very loosely hirsute to hirtellous without, glabrous within; petals 5, spatulate, rounded, 5.5-8 mm. long and 2-3 mm. wide, yellow, glabrous; stamens numerous, the filaments free to more or less long-connate, ca. 5-7 mm. long, the anthers somewhat arcuate, ca. 0.6-0.7 mm. long; ovary narrowly oblong, more or less 3-angled, ca. 1.7-2 mm. long and 0.7-0.8 mm. in diam., shortly sericeous or rarely glabrescent, 3-celled; style more or less 3-angled, ca. 1.5-2.5(-4) mm. long, glabrous; stigma peltate, shortly papillate. *Capsule* erect, linear, cylindrical, slightly 3-sulcate, long-caudate-acuminate at the apex, 3-6 cm. long and ca. 2 mm. in diam., 3-celled, the valves chartaceous and glabrous or nearly so at maturity; seeds numerous, polygonal, ca. 1.5 mm. long, the testa black.

Southern United States (Florida to Texas and Arizona), Central America, West Indies and tropical South America; chiefly in moist thickets and in weedy fields.

CANAL ZONE: Summit, *Standley* 26907; vicinity of Summit, *Standley* 30130; around Culebra, alt. 50-150 m., *Pittier* 4775; along the old Las Cruces Trail, between Fort Clayton and Corozal, *Standley* 29088; Balboa, *Standley* 25534, 26069; Sosa Hill, Balboa, *Standley* 25230; vicinity of Balboa, *Bro. Celestine* 7. PANAMA: along the Corozal Road, near Panama, *Standley* 26768; Camino de Las Sabanas, *Bro. Heriberto* 200; La Exposición, *Bro. Heriberto* 242; Bella Vista, *Standley* 25329; vicinity of Juan Franco Race Track, near Panama, *Standley* 27686; between Matias Hernández and Juan Díaz, *Standley* 32050; near Matias Hernández, *Standley* 28969; Agricultural Experiment Station at Matias Hernández, *Pittier* 6811; Pearl Islands, Trapeche Island, *Miller* 1872.

5. *MORTONIODENDRON* Standley & Steyerf.

MORTONIODENDRON Standley & Steyerf., Field Mus. Nat. Hist., Bot. Ser. **17**: 411. 1938.

Orthandra Burret, Notizbl. Bot. Gart. Mus. Berlin **15**: 13. 1940.

Shrubs or small to tall trees, the trunk sometimes buttressed, the hairs usually stellate, sometimes simple. *Leaves* alternate, petiolate, stipulate, the stipules very small and caducous, the blade entire, asymmetrical at the base, penninerved. *Inflorescences* terminal or axillary, cymose-paniculiform, the bracts very small.

Flowers hermaphrodite, actinomorphic, pedicellate, (3-)4- or 5-merous; calyx valvate, the sepals (3-)4-5, free, thick, fleshy, pubescent without, glabrous within; petals 4-5 or absent, free, valvate, somewhat shorter than the sepals; stamens numerous, all fertile, grouped into 4-5 phalanges opposite the petals, the filaments of each phalanx shortly connate at the base; anthers oblong, mucronate at the apex, 2-thecate, introrse, basifixus, erect, longitudinally dehiscent; ovary superior, sessile, (3-)4- or 5-celled, the cells many-ovulate (4-5 ovules in each cell?); style simple; stigma undivided. *Capsules* loculicidally dehiscent, (3-)4- or 5-loculate, each cell 1- to 3-seeded; seeds pendulous, arillate, the aril fleshy; albumen copious, carnose; cotyledons flat, foliaceous.

A genus of seven species confined to tropical Central America. Certain species are still imperfectly known, only the flowers being described or only the fruits, and some species may perhaps be reduced later to synonymy. Two species (one only known in fruit) occur in Panama. A single collection, lacking flowers, may represent however a third species.

- a. Tall tree; hairs stellate; branches minutely puberulous; blade of the leaves elliptic to oblong-elliptic, subcoriaceous; capsule ca. 4 cm. long and broad
.....1. *M. ANISOPHYLLUM*
- aa. Shrub; hairs mostly simple; young branches long-hirsute; blade of the leaves narrowly oblong, membranous; capsule ca. 2 cm. long and 2.5 cm. broad
.....2. *M. HIRSUTUM*

1. *MORTONIODENDRON ANISOPHYLLUM* (Standley) Standley & Steryerm., Field Mus. Nat. Hist., Bot. Ser. **17**: 411, fig. 26-27. 1938.—Fig. 5 (A-G).

Sloanea anisophylla Standley, Field Mus. Nat. Hist., Bot. Ser. **4**: 228. 1929.

Orthandra anisophylla (Standley) Burret, Notizbl. Bot. Gart. Mus. Berlin **15**: 13. 1940.

Tree 12-30 m. high, the trunk 45 cm. or even more in diam., often strongly buttressed, the crown spreading, the pubescence of stellate hairs, the branches shortly puberulous. *Leaves* with a petiole 8-12 mm. long, shortly tomentellous, the blade elliptic to oblong-elliptic, obtuse to rounded and asymmetric at the base, acuminate at the apex, 8-15 cm. long and 3.8-7.5 cm. wide, subcoriaceous, glabrous or nearly so above, very sparsely and shortly puberulous especially along the nerves beneath. *Inflorescences* terminal, of loose, paniculiform cymes, the axes shortly tomentellous. *Flowers* cream-white, the pedicel 5-13 mm. long; sepals 5, ovate to elliptic, acute 9-10 mm. long and 3.5-5 mm. wide, shortly tomentellous without, glabrous within; petals 5, elliptic, ca. 7 mm. long and 3 mm. wide; stamens glabrous, ca. 50, grouped into 5 phalanges of 10 stamens each, the filaments unequal, equalling or shorter than the anthers, shortly connate at the base for ca. 1 mm., the anthers unequal, 1.5-2 mm. long; ovary pyriform, ca. 3 mm. long and wide, shortly tomentellous; style ca. 3 mm. long, shortly tomentellous at the base. *Capsule* ligneous, more or less globose, ca. 4 cm. long and broad, shortly tomentellous, 5-celled, each cell 2- to 3-seeded; seeds pyriform, ca. 10 mm. long and 6 mm. broad.

Native to Costa Rica and Panama.

BOCAS DEL TORO: region of Almirante, Cooper 352 (type).

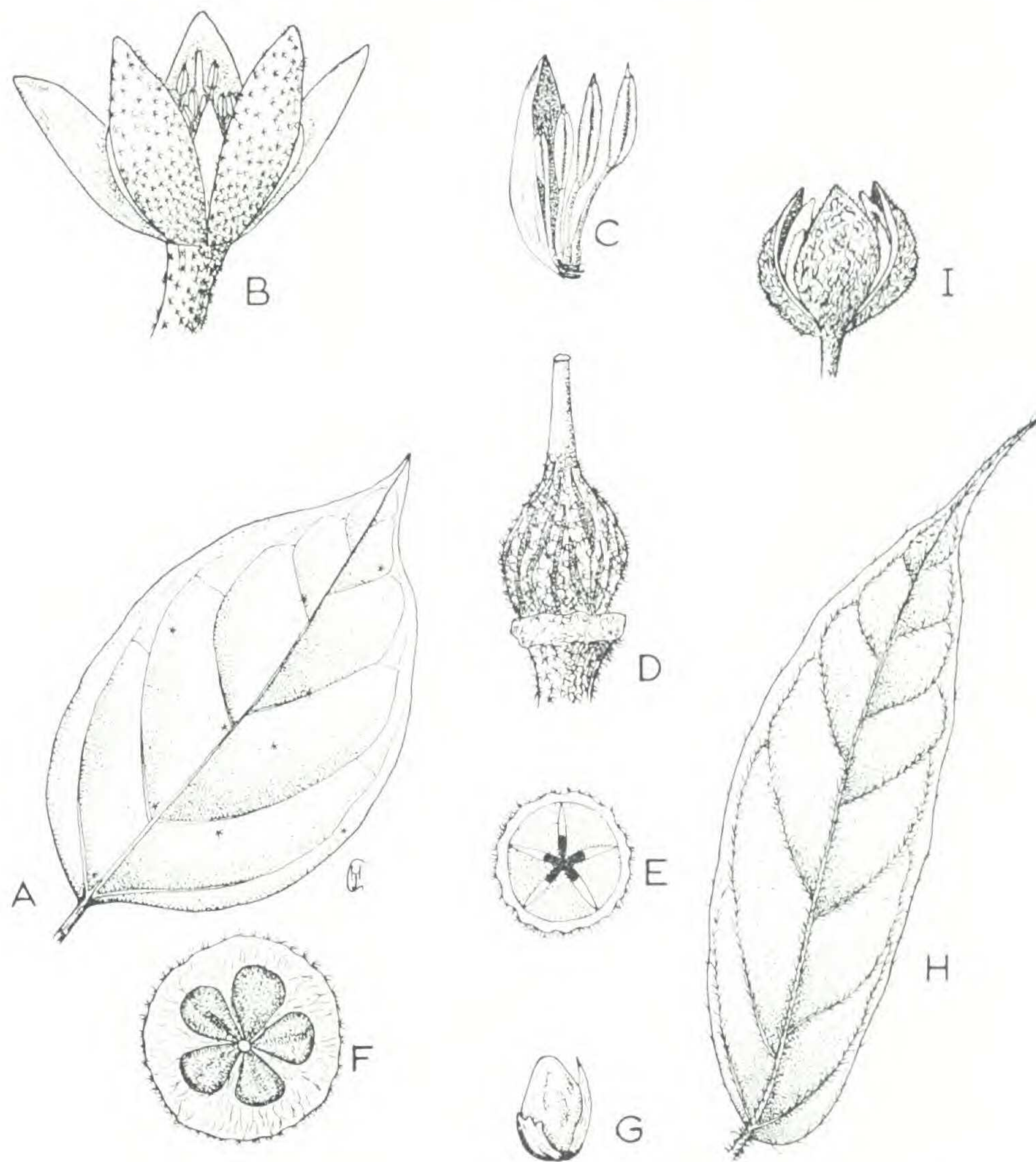


Figure 5. *MORTONIODENDRON ANISOPHYLLUM* (Standley) Standley & Steyerf.: A, leaf, lower surface ($\times \frac{1}{2}$); B, flower ($\times 2$); C, petal and 4 stamens ($\times 3$); D, ovary ($\times 4$); E, cross-section of ovary ($\times 4$); F, cross-section of capsule ($\times \frac{1}{2}$); G, seed ($\times 1$). *MORTONIODENDRON HIRSUTUM* Standley: H, leaf, lower surface ($\times \frac{1}{2}$); I, capsule ($\times 1$).

2. *MORTONIODENDRON HIRSUTUM* Standley, Ann. Missouri Bot. Gard. **29**: 359. 1942.
—Fig. 5 (H-I).

Shrub 1 m. high, the hairs mostly simple, the young branches long-hirsute. *Leaves* shortly petiolate, the petiole thick, 4-5 mm. long, densely long-hirsute, the blade narrowly oblong, much asymmetric at the base, acute on one side of the midrib and rounded to subcordate on the other side, very long-acuminate at the apex, 10.5-17 cm. long and 3-4.5 cm. wide, membranous, sparsely long-hirsute along the nerves on both surfaces, 3-nerved at the base, the nervation prominent beneath. *Inflorescences* terminal, few-flowered, the axes long-hirsute, the fructiferous pedicels ca. 12 mm. long. *Flowers* unknown. *Capsule* depressed-globose, ca. 2 cm. long and 2.5 cm. broad, shortly yellowish-tomentellous, the valves thick and ca. 12 mm. wide, 5-celled, each cell 2-seeded; seeds obtuse-angled, ca. 6 mm. in diam.

Native to Panama. This species is very closely related to the Honduran *M. membranaceum* Standley & Steyerl. (Field Mus. Nat. Hist., Bot. Ser. **22**: 158. 1948). It differs chiefly by the long hirsute pubescence of the young branches, of the leaves and of the inflorescence-axes. Lacking flowers of *M. hirsutum* and capsules of *M. membranaceum*, it is impossible to establish the relationship of the two species!

BOCAS DEL TORO: Water Valley, vicinity of Chiriquí Lagoon, *von Wedel* 1694 (type).

3. MORTONIODENDRON SP.

Tree 30 m. high, the hairs stellate, the young branches puberulous. *Leaves* with a petiole 8-10 mm. long, nearly glabrous above and tomentellous beneath, the blade ovate to elliptic, much asymmetric at the base, acute on one side of the midrib and rounded to subcordate on the other side, acute to obtuse at the apex, 6-10 cm. long and 3.5-4.5 cm. wide, subcoriaceous, glabrous or nearly so above, tomentellous at the base of the midrib to scatteringly puberulous elsewhere beneath, 3-nerved at the base, the nervation prominent beneath. *Inflorescences* terminal, few-flowered, the axes tomentellous, the fructiferous pedicels ca. 9 mm. long. *Flowers* unknown. *Capsule* more or less globose, apiculate, ca. 14 mm. in diam., shortly tomentellous, 5-celled; seeds ca. 5 mm. long and 4 mm. broad.

This species is related to the Guatemalan species, *M. guatemalense* Standley & Steyerl. (Field Mus. Nat. Hist., Bot. Ser. **22**: 157. 1948), but differs in the shape and the texture of the leaves and by the 5-celled capsule. In *M. guatemalense*, the membranous leaves are oblong-elliptic or oblong-lanceolate and long-acuminate, and the ovary is 3-(cf. Miranda, Anal. Inst. Biol. Univ. Mex. **27**: 331, fig. 3 (B). 1956) or 4-celled (observation on type material, *Hatch & Wilson* 54). Study of additional material is necessary in order to evaluate these differences.

COCLÉ: region north of El Valle de Antón, alt. 1,000 m., *Allen* 3728.

6. APEIBA Aubl.

APEIBA Aubl., Hist. Pl. Gui. Fr. 537. 1775.

Aubletia Schreb. in L., Gen. Pl. ed.8, 353. 1789.

Oxytandrum Neck., Elem. Bot. **2**: 255. 1790.

Trees or tall shrubs, the pubescence of stellate hairs or fimbriate lepidotes. *Leaves* alternate, petiolate, the stipules rapidly or tardily deciduous, the blade with entire or serrulate margins, 3- to 5(-7)-palminerved. *Inflorescences* oppositifolious or terminal, paniculate. *Flowers* hermaphrodite, actinomorphic, pedicellate, bracteolate; calyx valvate, the sepals 4-5, free or sometimes very slightly connate at the base, deciduous; petals 4-5, free, imbricate, glandless; stamens numerous, free or usually connate into a short staminal tube, the filaments short; anthers 2-theate, introrse, basifixus, erect, longitudinally dehiscent, with a sterile membranous appendage of the connective at the top; ovary superior, sessile, (8-)10- to many-celled, the cells many-ovulate; style simple; stigma minutely denticulate. *Capsules*

ligneous, transversely elliptic, densely to coarsely bristly or spinose, opening at the top by woody teeth or by a nearly circular hole; seeds numerous, small, embedded in a lustrous pulp, the testa thin-coriaceous; albumen carnose; embryo straight; cotyledons orbicular-cordate.

A neotropical genus of seven species of which two occur in Central America and in Panama.

- a. Leaves more or less rugose and sparsely stellate-puberulous above, densely stellate-arachnoid beneath; appendage of the anthers ca. 1 mm. long; capsule transversely elliptic, ca. 4 cm. long and 7-8 cm. broad, covered with long flexible and stout hirsute bristles 1. *A. TIBOURBOU*
- aa. Leaves scatteringly and minutely stellate-puberulous to glabrate above, densely and very minutely fimbriate-lepidote and generally with tufts of brownish hairs in the axils of the secondary nerves beneath; appendage of the anthers ca. 4-4.5 mm. long; capsule transversely narrow-elliptic, ca. 1.5 cm. long and 5.5-6.5 cm. broad, covered with short to rather long, stout, conic-based, minutely puberulous to glabrate spines 2. *A. MEMBRANACEA*

1. *APEIBA TIBOURBOU* Aubl., Hist. Pl. Gui. Fr. 538, t.213. 1775; Johnston, Sargentia **8**: 192. 1949.

Apeiba hirsuta Lam., Encycl. Méth. Bot. 1: 203. 1783.

Apeiba cimbalaria Arruda, Diss. Pl. Brazil 46. 1810.

Apeiba tibourbou var. *rugosa* Szyszyl., Diss. Math.-Phys. Acad. Crac. **27**: 140. 1894.

Tree 6-30 m. high, the trunk 20-35 cm. or even more in diam., sometimes with small buttresses, the crown spreading, the branchlets densely hirsute. *Leaves* with a petiole 1.3-3 cm. long, densely long-hispid, the stipules triangular, acuminate at the apex, the margins entire or serrate, 2-3 cm. long and ca. 1 cm. wide at the base, densely sericeous without, glabrous within except the sericeous base, rather tardily deciduous; blade ovate, elliptic to oblong-elliptic, sometimes slightly obovate, cordate at the base, acute to long-apiculate at the apex, 10-33 cm. long and 5.5-15 cm. wide, firm-chartaceous, the margins serrulate, more or less rugose and rather sparsely stellate-puberulous above, densely stellate-arachnoid beneath, 5(-7)-palminerved, the nervation prominent beneath. *Inflorences* oppositifolious, the axes covered with 2 kinds of hairs, a lower tier densely and shortly stellate-puberulous and an upper tier more or less sparsely long-hirsute, the bracts stipuliform, densely sericeous without, glabrous or nearly so within. *Flowers* with a pedicel 0.8-1.7 cm. long, the sepals 4-5, lanceolate to oblong-lanceolate, cucullate and acute, 1.5-2.2 cm. long and 0.5-0.4 cm. wide, fleshy, covered with 2 kinds of hairs, a lower tier densely and shortly stellate-puberulous and an upper tier sparsely long-sericeous, glabrous within; petals 4-5, spatulate to more or less obovate, rounded and somewhat emarginate, 1.1-1.6 cm. long and 0.5-0.8 cm. wide, yellow, glabrous; stamens free to slightly connate, the filaments 3.5-4.5 mm. long, sparsely long-pilose especially above, the anthers linear, ca. 3-3.5 mm. long, sparsely long-pilose especially at the base and along the margins, the appendage often bifid and ca. 1 mm. long; ovary more or less globose, somewhat depressed at both ends, ca. 3 mm. long and 4.5 mm. broad, densely and shortly hirsute, many-celled; style 0.8-1.2 cm. long, glabrous; stigma shortly denticulate.

Capsule transversely elliptic, somewhat concave at the apex, ca. 4 cm. long and 7-8 cm. broad, very densely covered with long, flexible and stout bristles, these up to 1.5 cm. long and hirsute; seeds more or less globose, somewhat flattened, ca. 2.5 mm. in diam.

Throughout tropical Central and South America, in dry forests and thickets or in open sunlight, at edge of savannas and along roads. Colloquial names reported in Panama are *peine de mico* (monkey-comb), *cortezo* and *cortez*.

CANAL ZONE: Chagres, Isthmus of Panama, *Fendler* 326; near Fort Randolph, *Maxon & Harvey* 6528a; Gatun, *Hayes* 106, 193, 220, 1034; lake shore along Gatun River Valley, *Pittier* 6743; Barro Colorado Island, *Bangham* 376, 390, *Ebinger* 262, *Kenoyer* 431, *Killip* 40011, *Salvoza* 850, *Shattuck* 287, *Starry* 143, *Wetmore & Abbe* 44, 124, *Woodworth & Vestal* 352, 504, 694, *Zetek* 5084; Mamei Hill, alt. 20-90 m., *Pittier* 3799; around Gamboa, alt. 20-100 m., *Pittier* 4801; Cerro Gordo, near Culebra, *Standley* 25960; Pedro Miguel, *Piper* 5515; Cerro Luisa, above Pedro Miguel Locks, *Stern & Chambers* 7; between Miraflores and Pedro Miguel, *P. & G. White* 48; C2 east of Fort Clayton, *Harvey* 5105; vicinity of Río Cocoli, Road K-9, *Stern, Chambers, Dwyer, Ebinger* 323, 331; Balboa, *Standley* 29290; about 2 miles west of Balboa, *Correll* 12254; Balboa Heights, *J.M. & M.T. Greenman* 5058; western slope of Ancon Hill, vic. of Balboa. 20-75 m., *Seibert* 391; Ancon Hill, *Bro. Gervais* 311, *Bro. Heriberto* 132, *Killip* 12111, *Maxon* 6776; sabanas along drowned Río Azote Caballo, 66-70 m., *Dodge, Steyermark & Allen* 16849; locality unknown, *Johansen* 8. CHIRIQUÍ: Progreso, *Cooper & Slater* 163. COCLÉ: Penonomé and vicinity, *R.S. Williams* 320. DARIEN: vicinity of El Real, ca. 15 m., *Allen* 960; trail between Caná and Boca de Cupe, vicinity of El Real, along road to Río Pirre, *Stern, Chambers, Dwyer, Ebinger* 601; vicinity of Campamento Buena Vista, Río Chucunaque above confluence with Río Tuquesa, *Stern, Chambers, Dwyer, Ebinger* 860. PANAMA: near Arraijan, ca. 15 m., *Woodson, Allen & Seibert* 1362; Panama, *Seemann* 316; Sabanas, *Bro. Paul* 71; Bella Vista, *Macbride* 2745; east of Bella Vista, *Maxon & Valentine* 6936; near Matias Hernández, *Standley* 28950; near the big swamp east of the Río Tocumen, *Standley* 26547; along road between Panama and Chepo, *Dodge, Hunter, Steyermark & Allen* 16631; Chepo, *Kluge* 57; 5-6 mi. e. of Chepo on Pan-Am. Highway, *Duke* 4051; Taboga Island, *Killip* 3200; Pedro Gonzalez Island, *Allen* 2601; San José Island, *Erlanson* 99, 247, 289, *Harlow* 64, *Johnston* 8. SAN BLAS: Permé, *Cooper* 236; locality unknown, *Cooper* 277. VERAGUAS: vicinity Santa Fe - Río Santa Maria, 1,000 ft., *Allen* 4415.

2. APEIBA MEMBRANACEA Spruce ex Benth., Jour. Proc. Linn. Soc., Bot. **5** (Suppl. 2): 61. 1861.—Fig. 6.

Apeiba aspera Aubl., Hist. Pl. Gui. Fr. 545, t.216. 1775; Standley, Contr. U. S. Nat. Herb. **27**: 47. 1928

Tree 20-30 m. tall, the trunk attaining 75 cm. in diam., the branchlets shortly stellate-puberulous. *Leaves* with a petiole slightly enlarged at the apex, 1-3.3 cm. long, shortly stellate-puberulous on the lower part to shortly stellate-tomentellous on the upper part, the stipules rapidly deciduous; blade oblong-elliptic to oblong-obovate, rounded to subcordate at the base, acuminate at the apex, 7-26 cm. long and 3-9.5 cm. wide, rigid-chartaceous, the margins entire to slightly subserrulate, scatteringly and very shortly stellate-puberulous to glabrate above, densely and very shortly fimbriate-lepidote and generally with tufts of brownish hairs in the axils of the secondary nerves beneath, 3-palminerved, the nervation prominent especially beneath. *Inflorescences* oppositifolious, the panicles loose and few-flowered, the axes shortly stellate-tomentellous, the bracts missing at

anthesis. *Flowers* with a pedicel 1-1.2 cm. long, the sepals 5, narrowly lanceolate, very slightly connate at the base, cucullate and acute at the apex, 1.8-2.6 cm. long and 0.3-0.5 cm. wide, fleshy, shortly stellate-tomentellous to stellate-puberulous outside, sometimes mixed with scattered, long hairs, glabrous within; petals 5, spatulate to obovate-spatulate, rounded and more or less deeply

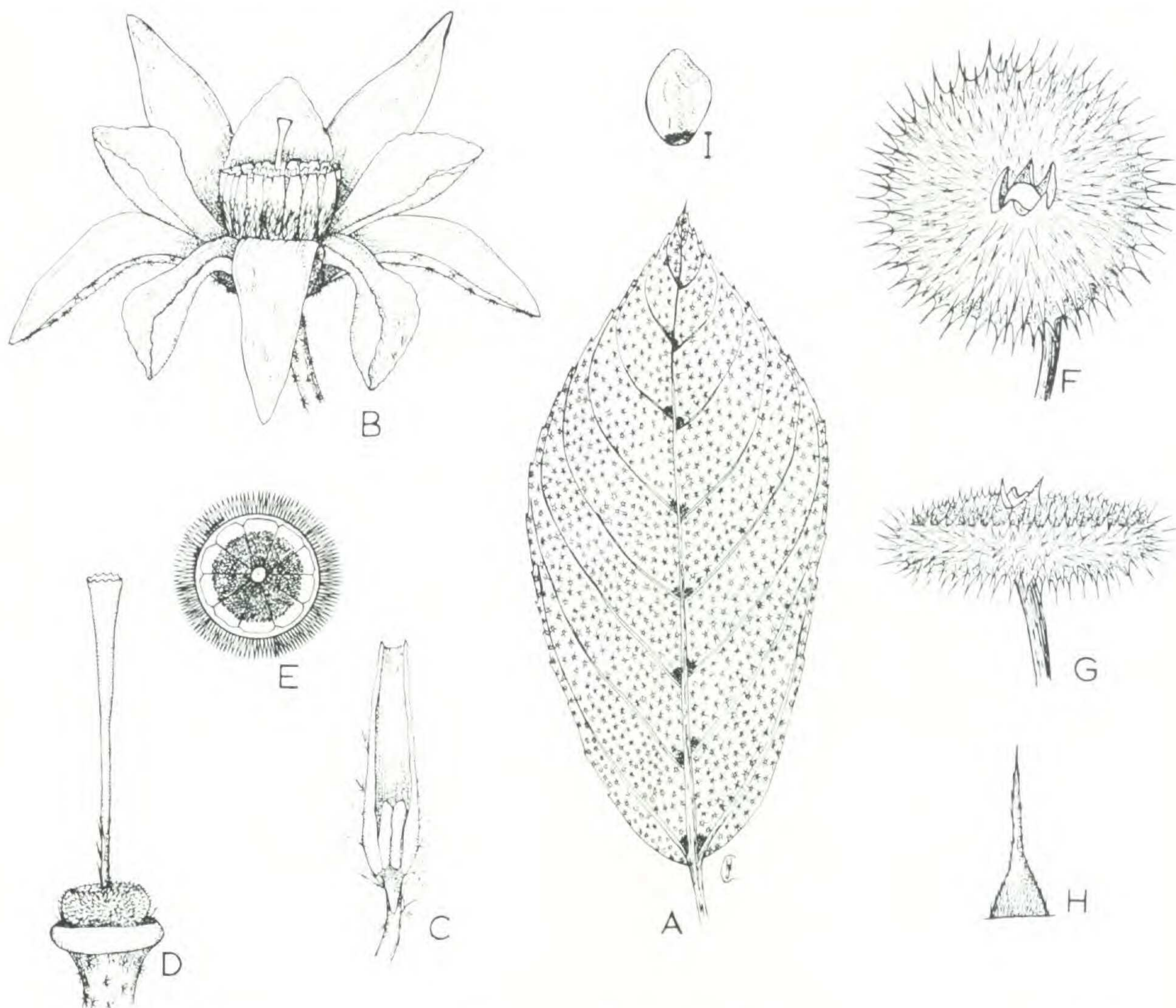


Figure 6. *APEIBA MEMBRANACEA* Spruce ex Benth.: A, leaf, lower surface ($\times \frac{1}{2}$); B, flower ($\times \frac{1}{2}$); C, anther ($\times 4$); D, gynoecium ($\times 2\frac{1}{2}$); E, cross-section of ovary ($\times 5$); F, capsule from above ($\times \frac{1}{2}$); G, capsule, lateral view ($\times \frac{1}{2}$); H, spine of capsule ($\times 2\frac{1}{2}$); I, seed ($\times 2\frac{1}{2}$).

emarginate, 1.35-2 cm. long and 0.65-1.3 cm. wide, yellow, glabrous; stamens connate into a very short tube ca. 1.5-2 mm. long, the filaments ca. 1.5 mm. long, long-pilose, the anthers ca. 2 mm. long, sparsely pilose especially at the base and along the margins, the appendage retuse and ca. 4-4.5 mm. long; ovary transversely elliptic, ca. 1.5 mm. long and 3.5 mm. broad, densely scabrous-hispidulous, many-celled; style ca. 1.2 cm. long, sparsely hispidulous at the base; stigma shortly denticulate. *Capsule* transversely narrow-elliptic, sometimes apiculate, ca. 1.5 cm. long and 5.5-6.5 cm. broad, densely covered with short to rather long, stout, conic-based spines, these shortly puberulous to glabrate; seeds ca. 3.5-4 mm. long and 2.5-3 mm. broad.

Costa Rica and Panama, western South America from Colombia to northern Bolivia; forested hills.

In the past, all the collections of Panama were referred to *A. aspera* Aubl., a name considered by Uittien (Rec. Trav. Bot. Néerl. **22**: 360. 1925) as *nomen confusum*, Aublet (Hist. Pl. Gui. Fr. 545, t. 216. 1775) confusing here two species, *A. echinata* Gaertn. and *A. glabra* Aubl. The taxonomy of some species of this group is still unsatisfactory in spite of the revision made by Uittien (loc. cit. **32**: 244-251, fig. 4. 1935). In distinguishing species in his revision, he uses as essential basis the shape of the capsule and the nature of the pubescence of the leaves, the latter character well known to be extremely variable in the *Malvales*. In the absence of an exhaustive study of all available herbarium material, I am obliged to use the conclusions of Uittien, suggesting nevertheless that *A. membranacea* and the very closely related species, *A. echinata* Gaertn. emend. Uitt. (Guianas, north-eastern Brazil), are doubtfully specifically distinct and form perhaps only the extreme variation within a single taxon.

BOCAS DEL TORO: Water Valley, von Wedel 810. CANAL ZONE: Barro Colorado Island, Shattuck 1157, Standley 31367, Wetmore & Abbe 115; drowned forest of upper Río Pequeni between Salamanca Hydrographic Station and Río Boqueron, 70 m., Allen 17286. COCLÉ: region north of El Valle de Antón, alt. 1,000 m., Allen 3746. COLÓN: between France Field, Canal Zone and Catival, Standley 30303; Zona de la Gloria, near Fato (Nombre de Dios), alt. 10-104 m., Pittier 4087; Guarunta, Wisperini Camp, 50-75 ft., C. & W. von Hagen 1395. DARIEN: Río Chico, vicinity Yaviza, 100 ft., Allen 4578; on trail between Paya and Pucra, Río Paya, Stern, Chambers, Dwyer, Ebinger 215; Caná and vicinity, R. S. Williams 947. PANAMA: vicinity of Arenoso, lower Río Trinidad, 26-50 m., Seibert 627. PROVINCE UNKNOWN: Hayes s.n.

7. HELIOCARPUS L.

HELIOCARPUS L., Sp. Pl. 448. 1753, Gen. Pl. ed. 5, 205. 1754.

Adenodiscus Turcz., Bull. Soc. Imp. Nat. Moscou **19**(2): 504. 1846.

Shrubs or trees, the pubescence of stellate hairs, the young branches usually pubescent, the older ones glabrate or nearly so. *Leaves* alternate, petiolate, stipulate, the stipules usually large, fugacious or infrequently persistent, the blade entire or 3-lobate, sometimes auriculate-appendaged at the base, the margins irregularly serrate, the basal serrations usually glandular, 3- to 7-palminerved. *Inflorescences* gynodioecious or hermaphrodite, usually terminal, infrequently axillary, large, paniculiform, the ultimate branchlets bearing clustered cymes. *Flowers* either hermaphrodite or pistillate, actinomorphic, pedicellate, 4- to 5-merous; calyx valvate, the sepals sometimes minutely appendiculate at the apex, usually pubescent without, glabrate within; petals 4-5 in the hermaphrodite flowers, absent in the pistillate ones, free, valvate, shorter than the sepals, glandless; stamens 12-40 in the hermaphrodite flowers, staminodial or absent in the pistillate ones, inserted on an enlarged and very short gonophore, the filaments free; anthers 2-thecate, introrse, more or less medifixus, versatile, longitudinally dehiscent; ovary superior, sessile on the gonophore or borne on a gynophore, laterally compressed, ciliate along the margins and with shorter pubescence on the

faces, 2-celled (falsely 4-celled at the base), the cells 2-ovulate; style filiform, bifid, the stigma-lobes spreading, simple or slightly 2- to 3-lobulate. *Fruit* capsular, sessile or stipitate upon the accrescent gynophore, laterally compressed and bearing along the margins 2 rows of long plumose bristles, the faces pubescent or glabrate, indehiscent, 2-loculate, (1-)2(-3)-seeded; seeds small, pendulous, compressed-ovoid or compressed-pyriform; albumen carnose; embryo straight; cotyledons plane, foliaceous.

A neotropical genus of ten species of which only one occurs in Panama.

1. *HELIOCARPUS POPAYANENSIS* H. B. K., Nov. Gen. Sp. Pl. **5**: 341. 1823; Lay, Ann. Missouri Bot. Gard. **36**: 532, fig. 10. 1949.—Fig. 7.

Heliocarpus trichopodus Turcz., Bull. Soc. Imp. Nat. Moscou **31**(1): 226. 1858.

Heliocarpus americanus L. var. β *popayanensis* (H. B. K.) K. Schum. in Mart., Fl. Bras. **12**(3): 142. 1886.

Heliocarpus polyandrus S. Wats. var. *nodiflorus* J. D. Sm., Bot. Gaz. **23**: 240. 1897.

Heliocarpus nodiflorus (J. D. Sm.) J. D. Sm. & Rose, Contr. U. S. Nat. Herb. **5**: 126. 1897.

Heliocarpus americanus var. *Schumanni* E. G. Baker, Jour. Bot. **36**: 131. 1898.

Heliocarpus popayanensis var. *Purdiei* E. G. Baker, loc. cit. 132. 1898.

Heliocarpus popayanensis var. *trichopoda* (Turcz.) E. G. Baker, loc. cit. 132. 1898.

Heliocarpus popayanensis var. *grandifolius* Hochr., Ann. Conserv. Jard. Bot. Genève **18**: 116. 1914.

Heliocarpus dielinus Hochr., loc. cit. 117. 1914.

Heliocarpus boliviensis Hochr., loc. cit. 118. 1914.

Heliocarpus Rosei Hochr., loc. cit. 119. 1914.

Heliocarpus stipulatus Hochr., loc. cit. 121. 1914.

Heliocarpus australis E. E. Wats., Bull. Torr. Bot. Club **50**: 124. 1923.

Heliocarpus rudis E. E. Wats., loc. cit. 126. 1923.

Heliocarpus subtrilobus Sprague, Bot. Mag. **61**: 257. 1923.

Heliocarpus excelsior Merton, Jour. Wash. Acad. Sci. **27**: 307. 1937.

Heliocarpus Gentlei Lundell, Phytologia **2**: 3. 1941.

Tree 6-30 m. tall, the young branches ferruginous-tomentellous to puberulous, the older ones glabrate. *Leaves* with a petiole 6-8 cm. long, ferruginous-puberulous, the blade broadly ovate to ovate-cordate, rounded to deeply cordate at the base, usually with 3 acuminate lobes, sometimes obscurely 3-lobed or only acuminate at the apex, 16-20 cm. long and 14-18 cm. wide, discolored, the margins irregularly serrulate, the upper surface dark green, sparsely and shortly ferruginous-puberulous, the lower surface light green and ferruginous-puberulous, 5- to 7-palminerved, the nervation very slightly prominent beneath. *Inflorescences* gynodioecious, usually terminal, the cymes ca. 12- to 20-flowered, sometimes condensed in nodose clusters, the flowering peduncles 3-radiate. *Hermaphrodite flower* with a pedicel ca. 2-4 mm. long, tomentellous, the sepals 4, narrowly lanceolate, acute and somewhat cucullate, ca. 4-7 mm. long and 1-1.2 mm. wide, fleshy, tomentellous without, glabrous within; petals 4, narrowly spatulate, ca. 3-4.5 mm. long and 0.5-0.75 mm. wide, glabrous; stamens about 12-24, the filaments ca. 3-4 mm. long, the anthers ca. 0.75 mm. long; ovary borne on a very short gynophore ca. 0.5 mm. long, cvoid to suborbicular, ca. 0.6-0.8 mm. long and 0.5-0.7 mm. broad; style ca. 1-2 mm. long, bifid about one third of its length, the stigma-lobes usually obscurely 2- to 3-lobulate. *Pistillate flower* with a pedicel ca. 2 mm. long, tomentellous, the

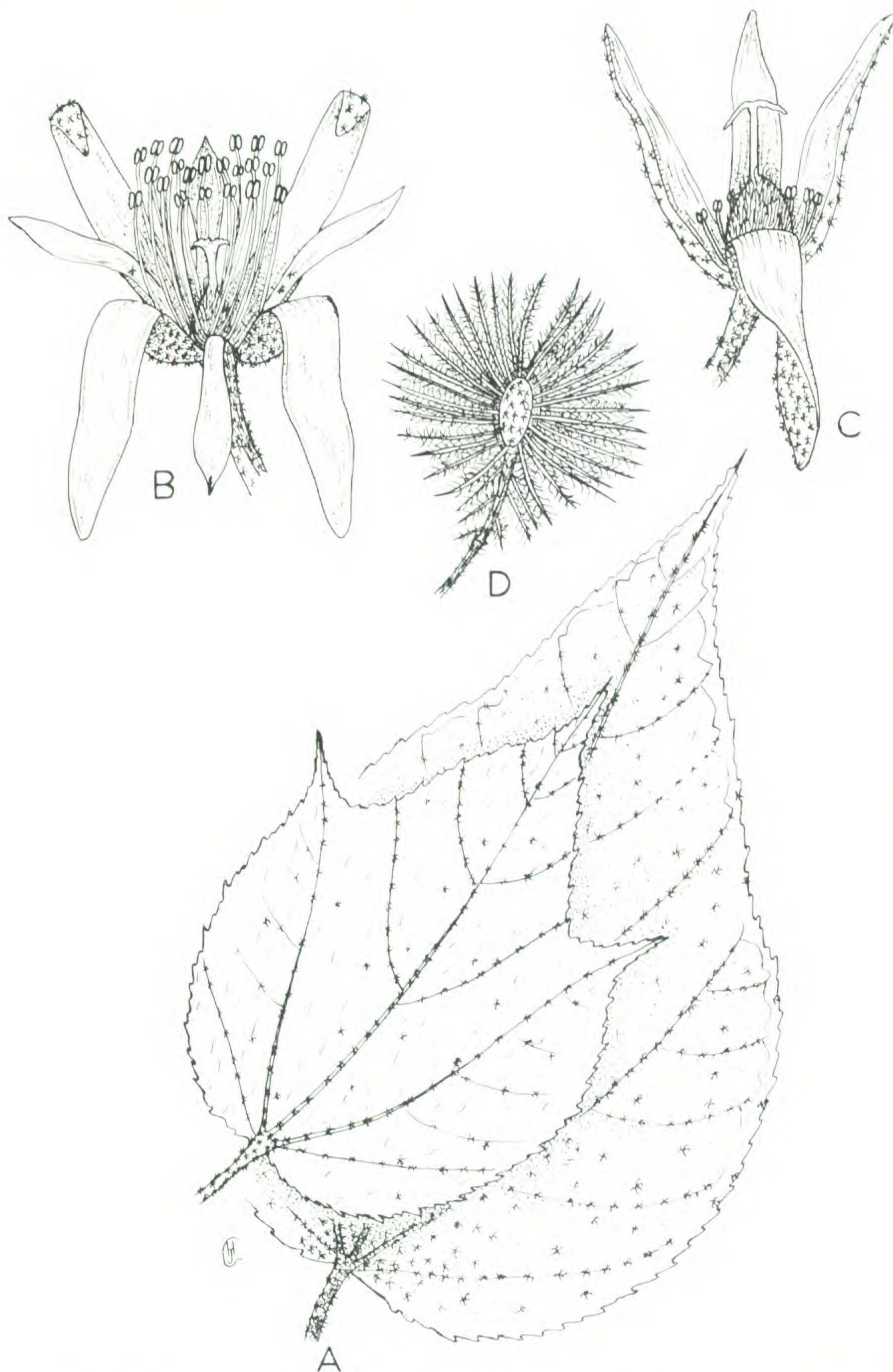


Figure 7. *HELIOCARPUS POPAYANENSIS* H. B. K.: A, leaves, lower surface ($\times \frac{2}{3}$); B, hermaphrodite flower ($\times 6\frac{2}{3}$); C, pistillate flower ($\times 6\frac{2}{3}$); D, fruit ($\times 2\frac{2}{3}$).

sepals 4, narrowly lanceolate, acute and somewhat cucullate, ca. 4-5.5 mm. long and 1-1.5 mm. wide, fleshy, tomentellous without, glabrous within; petals reduced or absent; staminodes numerous; ovary borne on a very short gynophore ca. 0.5 mm. long, more or less suborbicular, ca. 1-1.2 mm. in diam.; style ca. 1.3-1.8 mm. long, slightly bifid to bifid about one third of its length, the stigma lobes obscurely lobulate. *Fruit* ellipsoid to slightly obovoid, the accrescent gynophore ca. 5-10 mm. long, shortly stellate-hirsute and provided with some plumose bristles, the body ca. 3-4 mm. long and 2-3 mm. broad, the plumose bristles ca. 4-7 mm. long, the faces covered either with stellate hairs or with shorter plumose bristles and stellate hairs; seeds ovoid, ca. 2.5 mm. long, with a depression in the middle.

A species which extends from southern Mexico to northern Argentina and grows usually at altitudes from 500-2,500 m., in secondary forested valleys or on slopes; the local name is *majagüillo*.

CANAL ZONE: Gatun, *Ostenfeld* 50; Barro Colorado Island, *L.H. & E.Z. Bailey* 380, *Frost* 218, *Shattuck* 662, 754, *Wetmore*, *Abbe & Aviles* 108, *Woodworth & Vestal* 730, 748; Darien Station, *Standley* 31552; Empire Station, *Hayes* 437; Empire to Mandinga, *Piper* 5532; Cerro Gordo, near Culebra, alt. 50-290 m., *Pittier* 2305; C 16, back of Curundu, *Harvey* 5288; along an old trail above the Reservoir, 1 to 3 miles from Gorgona, alt. 40-150 m., *Maxon* 4751; locality unknown, *Christopherson* 117. CHIRIQUÍ: valley of the upper Río Chiriquí Viejo, *P. White* 29; vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, *Allen* 1398; vicinity of Cerro Punta, alt. 2,000 m., *Allen* 1519; slopes of Volcán Baru, near town of Cerro Punta, alt. 6,000 ft., *Stern & Chambers* 77; between Cerro Vaca and Hato del Loro, alt. 850-1,100 m., *Pittier* 5392; around Camp Aguacatal, eastern slope of Chiriquí Volcano, alt. 2,100-2,200 m., *Pittier* 3082. COCLÉ: hills south of El Valle de Antón, alt. 600-800 m., *Allen* 2849; south rim of El Valle de Antón, alt. 650 m., *Allen* 2912; El Valle de Antón, along Río Indio trail, 500-700 m., *Hunter & Allen* 304. COLÓN: vicinity of Gatuncillo, *Piper* 5612. DARIEN: Caná and vicinity, *R. S. Williams* 827; locality unknown, *Macbride* 2713. PROVINCE UNKNOWN: *Cowell* 270, 271, *Hayes* 947, 1015.

8. TRIUMFETTA L.

TRIUMFETTA L., Sp. Pl. 444. 1753, Gen. Pl. ed. 5, 203. 1754.

Bartramia L., Sp. Pl. 389. 1753, Gen. Pl. ed. 5, 184. 1754.

Porpa Blume, Bijdr. Fl. Nederl. Ind. 117. 1825.

Ceratosepalum Oliv., Hook. Ic. Pl. t. 2307. 1894.

Shrubs or trees, the pubescence usually of stellate hairs. *Leaves* alternate, petiolate, stipulate, the stipules usually large and persistent, rarely fugacious, the blade entire or 3- to 5-lobed or rarely 5- to 7-partite, the margins irregularly serrate, the basal serrations usually glandular, 3- to 7-palminerved. *Inflorescences* hermaphrodite or gynodioecious, usually axillary, sometimes terminal, consisting generally of numerous aggregate dichasia, the bracts foliaceous. *Flowers* either hermaphrodite or pistillate, actinomorphic, pedicellate, generally 5-merous, rarely 4- or 6-merous; sepals valvate, with apical appendages, usually pubescent without, glabrous within; petals sometimes absent, free, imbricate, shorter than the sepals, usually ciliate at the base, glandless; gonophore short, sometimes obsolete, bearing 5 manifest glands opposite the petals, these sometimes united into a

full ring or sometimes absent, usually crowned by a ciliate membranous urceolus surrounding the stamens; stamens 5-60 in the hermaphrodite flowers, staminodial or absent in the pistillate ones, the filaments free; anthers 2-thecate, introse, more or less medifixus, longitudinally dehiscent; ovary superior, sessile on the gonophore, infrequently borne on a very short gynophore, ellipsoid to orbicular, covered with many, short, straight to uncinat, hyaline spinules, 2- to 5-loculate, the cells 2-ovulate; style filiform; stigma entire or shortly 2- to 5-parted. *Fruit* capsular, mostly sessile on the slightly accrescent gonophore, covered with many tubercles, bristles or spines elongating from the pericarp at the base of the spinules, the appendages glabrous or pilosulose and topped by the hyaline, straight to uncinat spinules, indehiscent or loculicidally dehiscent, 2- to 5-loculate, the cells 2-seeded, or falsely 6- to 10-celled, the cells 1-seeded, exceptionally 1-celled and 1-seeded by abortion; seeds pendulous, compressed-ovoid to pyriform, albuminous; embryo straight; cotyledons flat, foliaceous.

A large pantropical genus of about 150 species of which some are widely distributed as weeds in cultivated fields. In his recent revision of the genus for the New World, Ko Ko Lay (Ann. Missouri Bot. Gard. **37**: 315-395, 1950) recognizes 43 species in tropical America; five species are reported from Panama, but one other, *T. semitriloba* Jacq., is to be expected, while several others occur in Central America north of Panama.

- a. Hyaline spinules of ovary and fruit straight or arcuate; petals 5.
 - b. Flowers large, 3.4-3.7 cm. long; stamens ca. 20; fruit-body 6-8 mm. in diam.1. *T. SPECIOSA*
 - bb. Flowers small, 8-10 mm. long; stamens ca. 50; fruit-body 3-4 mm. long and ca. 2 mm. in diam2. *T. ARBORESCENS*
- aa. Hyaline spinules of ovary and fruit uncinat.
 - c. Petals 5; stamens 20-30; gonophore ca. 0.7-0.8 mm. long, bearing 5 manifest glands, the urceolus ca. 0.5 mm. long.
 - d. Flowers 12-18 mm. long; apical appendages of sepals 1-1.5 mm. long; petals 10.5-13 mm. long; fruit covered with very numerous spines (ca. 200), these sparsely hirtellous especially near the base...3. *T. GRANDIFLORA*
 - dd. Flowers 8-13 mm. long; apical appendages of sepals 1.8-2.5 mm. long; petals 7-9 mm. long; fruit covered with ca. 75 retrorsely pilosulose spines4. *T. BOGOTENSIS*
 - cc. Petals absent; stamens (5-)10(-15); gonophore and urceolus obsolete, glands absent; fruit covered with about 50 retrorsely pilosulose spines5. *T. LAPPULA*

1. *TRIUMFETTA SPECIOSA* Seem., Bot. Voy. Herald 86. 1853; Lay, Ann. Missouri Bot. Gard. **37**: 338. 1950.—Fig. 8.

Triumfetta macrocalyx Turcz., Bull. Soc. Imp. Nat. Moscou **31**(1): 230. 1858.
Triumfetta micropetala Hochr., Ann. Conserv. Jard. Bot. Genève **18**: 98. 1914.

Shrub 0.60-2 m. high, sometimes small tree up to 3-6 m. tall, the branches and inflorescence-axes rather densely ferruginous-arachnoid. *Leaves* with a petiole 1-5 cm. long or even more, very densely arachnoid, the blade rounded-ovate, often 3-lobate, rounded to more or less cordate at the base, the terminal lobe acuminate, the laterals short and generally rather obtuse, sometimes acuminate, 6-9 cm. long

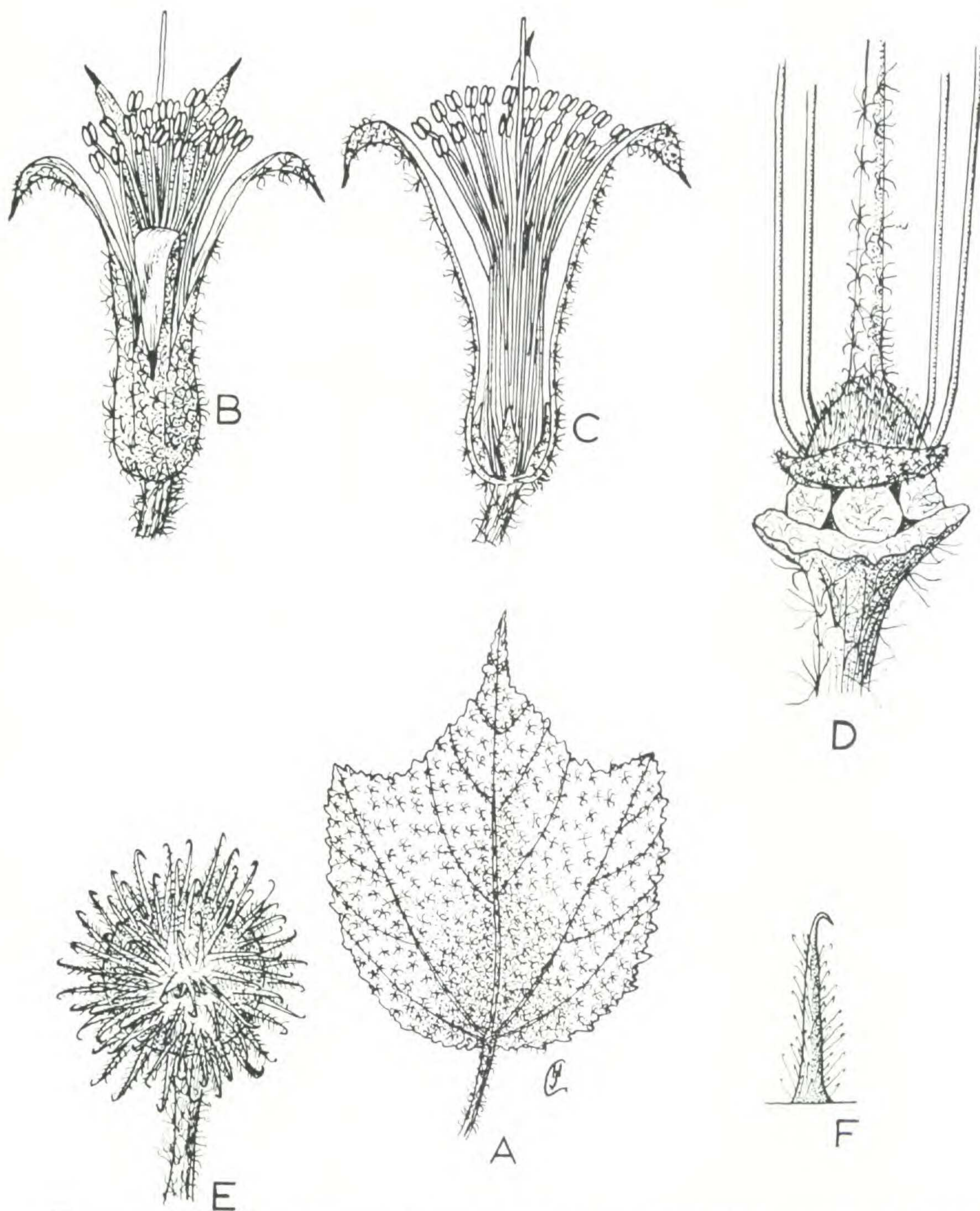


Figure 8. *TRIUMFETTA SPECIOSA* Seem.: A, leaf, lower surface ($\times \frac{2}{3}$); B, flower ($\times \frac{1}{3}$); C, id., longitudinal section ($\times \frac{11}{3}$); D, gonophore, urceolus, ovary, base of style and of 4 filaments ($\times 6\frac{2}{3}$); E, fruit ($\times 2\frac{2}{3}$); F, spine of fruit ($\times 6\frac{2}{3}$).

and 5-7 cm. wide, the margins very irregularly and bluntly serrate, the serrations often glandular, discolor, the upper surface dark green, lightly scabrous-puberulous, the lower surface pale green, densely arachnoid, 3- to 5- to 7-palminerved, the nervation not prominent. *Inflorescences* axillary, the cymes of 1-2 cymules, usually opposite the bracts, these ovate and short-petiolate, the peduncles 4-10 mm. long, the pedicels 4-8 mm. long, both densely arachnoid. *Flowers* large, 3.4-3.7 cm. long, hermaphrodite, the sepals 5, linear-lanceolate, acuminate, the appendages ca. 2-3 mm. long, 3.4-3.7 cm. long and ca. 3.5 mm. wide, long-hirsute without, glabrous within; petals 5, narrowly lanceolate, acute, only 6-7 mm. long and ca.

1.5 mm. wide, very densely hirsute at the base outside, glabrous inside except a transverse densely hirsute band near the base; gonophore ca. 1 mm. long, the 5 glands usually forming a full ring subequalling the gonophore, the urceolus ca. 0.7 mm. long, slightly undulate and densely stellate-ciliolate; stamens ca. 20, the filaments 2.7-3 cm. long, glabrous, the anthers ca. 1.5 mm. long; ovary broadly transversely elliptic, ca. 1 mm. long and 1.5 mm. broad, covered with numerous, slightly arcuate spinules; style 30-34 mm. long, hirsute at the base, the stigma acute. *Fruit* orbicular on the slightly accrescent gonophore, the body 6-8 mm. in diam., rather densely stellate-puberulous, the spines 100 or more, ca. 3 mm. long, densely hirtellous, the spinules arcuate, 4-celled and each cell 2-seeded when young, at maturity with 6-8 distinct, 1-seeded locules; seeds ovoid, ca. 2 mm. long.

Throughout Central America, from southern Mexico to Panama; open areas on slopes of mountains or along the rocky banks of streams at altitudes of 1,300-1,700 m.

CHIRIQUÍ: near Hacienda de Boquete, volcano of Chiriquí, *Seemann* 1240; volcan de Chiriquí, Boquete Distr., 7,000 ft., *Davidson* 515, 895; Finca Lerida to Boquete, ca. 1,300-1,700 m., *Woodson, Allen & Seibert* 1115; vicinity of El Boquete, *Maxon* 5081, *Pittier* 2924; Bajo Lino, Boquete, 3,500 ft., *Bro. Maurice* 876.

2 TRIUMFETTA ARBORESCENS (Seem.) Sprague, Kew Bull. 1923: 351. 1923; Lay, Ann. Missouri Bot. Gard. **37**: 344. 1950.

Heliocarpus arborescens Seem., Bot. Voy. Herald 86. 1853.

Shrub or small tree, up to 5-6 m. high, the branches and inflorescence-axes ferruginous-tomentellous. *Leaves* with a slender petioles 6-9 cm. long, ferruginous-tomentellous, the blade broadly ovate, usually 3-lobate, cordate at the base, the middle lobe long-acuminate, the laterals acute to acuminate, 10-13 cm. long and 7-10 cm. wide, the margins very irregularly serrate, the basal serrations generally glandular, discolor, the upper surface rather densely puberulous, the lower surface tomentose, usually 7-palminerved, the nervation slightly prominent beneath. *Inflorescences* terminal, the cymes of 3-5 cymules condensed in nodose clusters, the peduncles 2-4 mm. long, the pedicels 2-3.5 mm. long, both ferruginous-tomentellous. *Flowers* 8-10 mm. long, hermaphrodite, the sepals 5, obovate-linear, acute, the appendages ca. 1 mm. long, 8-10 mm. long (the appendages included) and ca. 1.5 mm. wide, palid and tomentellous without, yellow-brown and glabrescent within; petals obovate-spatulate, rounded, ca. 2.5 mm. long and 1 mm. wide, puberulous near the base; gonophore ca. 0.6-0.7 mm. long, with 5 distinct elliptic glands subequalling the gonophore, the urceolus ca. 0.4 mm. long and briefly ciliolate; stamens ca. 50-60, the filaments ca. 3-3.5 mm. long, glabrous, the anthers ca. 0.8 mm. long; ovary ovoid, ca. 0.7 mm. in diam., covered with straight spinules; style ca. 3.5-5 mm. long, glabrous; stigma very shortly 2-parted. *Fruit* suborbicular, the body 3-4 mm. long and ca. 2 mm. in diam., glabrescent, the spines ca. 75, 3-4 mm. long, sparsely hirtellous, the spinules straight to slightly arcuate, 2-celled, each cell 1-seeded; seeds pyriform, flattened, ca. 2.5 mm. long.

Costa Rica and Panama.

COCLÉ: Canton of Natá, on the banks of the Río de Santa Maria, *Seemann* 96 (type).
PROVINCE UNKNOWN: *Cowell* 239.

3. *TRIUMFETTA GRANDIFLORA* Vahl, *Eclog. Am.* **2**: 34. 1798; Lay, *Ann. Missouri Bot. Gard* **37**: 363. 1950.

Triumfetta nemoralis St.-Hil., Juss. & Camb., *Fl. Bras. Merid.* **1**: 221, t.56 (A). 1827.

Triumfetta longiseta DC., *Pl. Rar. Jard. Genève* 64. 1829.

Triumfetta longicuspis Turcz., *Bull. Soc. Imp. Nat. Moscou* **31**(1): 229. 1858.

Triumfetta cymosa Triana & Planchon var. *glabrescens* Triana & Planchon, *Ann. Sci. Nat., Bot., ser. 4*, **17**: 354. 1862.

Triumfetta cymosa var. *hirsuta* Triana & Planchon, loc. cit. 354. 1862.

Triumfetta grandiflora var. *brasiliensis* Hochr., *Ann. Conserv. Jard. Bot. Genève* **18**: 100. 1914.

Triumfetta boyacana Moldenke, *Phytologia* **1**: 10. 1933.

Triumfetta Schunkei Macbr., *Candollea* **5**: 381. 1934.

Shrub or small tree, 2-4 m. high, the young branches and inflorescence-axes more or less densely arachnoid, the hairs mostly stellate, the older branches glabrate. *Leaves* with a slender petiole 3-10 cm. long, arachnoid, the blade ovate to broadly ovate, rounded to cuneate at the base, long-acuminate at the apex, ca. 8-15 cm. long and 5-9 cm. wide, the margins irregularly serrate, the serrations often glandular especially near the base, both surfaces rather sparsely pubescent, the hairs mostly stellate, 3- to 7-palminerved, the nervation slightly prominent beneath. *Inflorescences* usually terminal, the cymes of 1-2 cymules, usually opposite the bracts, these narrowly ovate to narrowly elliptic, the peduncles ca. 4-7 mm. long, the pedicels ca. 3-6 mm. long. *Flowers* 12-18 mm. long, hermaphrodite, the sepals 5, narrowly oblong-lanceolate, acute, the appendages ca. 1-1.5 mm. long, 12-18 mm. long (the appendages included) and 1.5-2.5 mm. wide, sparsely hirsute to glabrescent without, glabrous within; petals 5, narrowly obovate-spatulate, rounded and subcrenate, 10.5-13 mm. long and 2.5-3 mm. wide, yellow, glabrous except the ciliate base; gonophore ca. 0.7-0.8 mm. long, with 5 distinct suborbicular glands, the urceolus undulate, ciliate and ca. 0.5 mm. long; stamens 20-30, the filaments 7-11 mm. long, glabrous, the anthers ca. 1 mm. long; ovary suborbicular, ca. 1.6-2 mm. long and 2.1-2.5 mm. broad, densely covered with uncinat spinules; styles 8-11 mm. long, glabrous; stigma obscurely parted. *Fruit* suborbicular, the body ca. 5-6 mm. in diam., glabrescent, the spines very numerous, ca. 200, ca. 4 mm. long, sparsely hirtellous especially near the base, the spinules uncinat, rather easily loculicidally dehiscent, 3- to 5-loculate, each cell 2-seeded; seeds pyriform, ca. 3 mm. long and 2 mm. wide.

Rather widely distributed throughout tropical America, though not abundant at any single locality, usually growing at altitudes of about 600-2,000 m. Only one specimen has been collected in Panama.

COCLÉ: vicinity of El Valle de Antón, alt. ca. 600 m., *Allen* 2027 or 2072.

4. *Triumfetta bogotensis* DC., Prodr. **1**: 506. 1824; Lay, Ann. Missouri Bot. Gard. **37**: 366. 1950.

Triumfetta pilosa H. B. K., Nov. Gen. Sp. Pl. **5**: 343. 1823, non Roth, Nov. Pl. Sp. 233. 1821.

Triumfetta sepium St.-Hil., Juss. & Camb., Fl. Bras. Merid. **1**: 222. 1827.

Triumfetta dumetorum Schlecht., Linnaea **11**: 377. 1837.

Triumfetta hispida A. Rich., Bot., Pl. Vasc. in Ramon de la Sagra, Hist. Phys. Pol. Nat. Cuba 204. 1845.

Triumfetta grossulariaefolia A. Rich., loc. cit. 205. 1845, t.22. 1850(?).

Triumfetta Lindeniana Turcz., Bull. Soc. Imp. Nat. Moscou **31**(1): 229. 1858.

Triumfetta Botteriana Turcz., loc. cit. **32**: 260. 1859.

Triumfetta orizaba Turcz., loc. cit. **32**: 261. 1859.

Triumfetta Josefina Polak., Linnaea **41**: 552. 1877.

Triumfetta vincentina Urb., Symb. Ant. **5**: 414. 1908.

Triumfetta valenciencis Kunth, Repert. Sp. Nov. Beih. **43**: 464. 1927.

Triumfetta panamensis Johnston, Sargentia **8**: 194. 1949.

Shrub 1-2 m. high, sometimes small tree up to 4 m. high, the branches covered with short stellate and long hirsute simple hairs especially when young. *Leaves* with a petiole 2-7 cm. long, covered with short stellate and long hirsute simple hairs, the blade broadly elliptic, usually 3-lobate, sometimes only obscurely so, rounded to subcordate at the base, the apex acuminate, 7-14 cm. long and 5-11 cm. wide, the margins irregularly and more or less bluntly serrate, the upper surface slightly hirsute and mostly with long simple hairs, the lower surface scatteringly puberulous with appressed stellate hairs and some spreading simple hairs, 5-palminerved, the nervation slightly prominent beneath. *Inflorescences* axillary or oppositifolious, the cymes of 2-3 cymules, the bracts lanceolate to narrowly elliptic, 3-10 cm. long and 1-5 cm. wide, the bracteoles narrowly lanceolate, ca. 3 mm. long, long-hirsute, the peduncles 4-7 mm. long, the pedicels 3-4 mm. long, both long-hirsute. *Flowers* 8-13 mm. long, hermaphrodite, the sepals linear, acute, the apical appendage ca. 1.8-2.5 mm. long, 8-13 mm. long (the appendages included) and ca. 1.5 mm. wide, fleshy, long-hirsute without, glabrous within; petals 5, narrowly obovate, ciliate at the base, more or less acute at the apex, 7-9 mm. long and ca. 2 mm. wide, yellow, sometimes orange; gonophore ca. 0.75 mm. long, bearing 5 distinct suborbicular glands subequalling the gonophore, the urceolus undulate, ciliate and ca. 0.5 mm. long; stamens 25-30, the filaments ca. 4-7 mm. long, glabrous, the anthers ca. 1 mm. long; ovary suborbicular, ca. 1 mm. in diam., densely covered with uncinat spinules; style filiform, 6-7 mm. long, glabrous; stigma obscurely 3-lobulate. *Fruit* spheroid on the slightly accrescent gonophore, the body ca. 4 mm. in diam., stellate-hirsute, the spines about 75, ca. 3-4 mm. long, retrorsely pilosulose, the spinules uncinat, 3- or 4-loculate, each cell 2-seeded; seeds lenticular, 2-3 mm. long and ca. 2 mm. wide.

A weedy species widely distributed throughout tropical America, growing in open sunlight, on hill-slopes, usually at altitudes of about 600-2,000 m.

CANAL ZONE: banks of the Chagres River, near sea level, Maxon 4799; Gamboa, Standley 28500, 28511, Las Cascadas Plantation, near Summit, Standley 29603; Empire to Mandinga, Piper 5452, 5453, 5462; Río Grande, near Culebra, alt. 50-100 m., Pittier 2128; Cerro Gordo, near Culebra, Standley 26024; vicinity of Miraflores, P. & G. White 52; along the

old Las Cruces Trail, between Fort Clayton and Corozal, *Standley* 29204; Balboa, *Standley* 25613; along an old trail above the Reservoir, 1 to 3 miles from Gorgona, alt. 40-150 m., *Maxon* 4730; base of Contractors Hill, *Dwyer* 2871. CHIRIQUÍ: Bajo Mona, mouth of Quebrada Chiquero, along Río Caldera, ca. 1,500-2,000 m., *Woodson, Allen & Seibert* 1002; vicinity of Bajo Mona and Quebrada Chiquero, alt. 1,500 m., *Woodson & Schery* 592; Boquete, alt. 4,000 ft., *Davidson* 861; vicinity of El Boquete, *Bro. Maurice* 692. PANAMA: hills above Campana, alt. 600-800 m., *Allen* 1309; along the Corozal Road, near Panama, *Standley* 26789; Tumba Muerto Road, near Panama, *Standley* 29762; vicinity of Juan Franco Race Track, near Panama, *Standley* 27697; vicinity of Bella Vista, *Piper* 5355; Sabanas, *Bro. Paul* 234; between Las Sabanas and Matias Hernández, *Standley* 31838; Agricultural Experiment Station at Matias Hernández, *Pittier* 6914, 6925; near Matias Hernández, *Standley* 28964; San José Island, *Johnston* 1112. PROVINCE UNKNOWN: *Hayes* 325.

5. TRIUMFETTA LAPPULA L., Sp. Pl. 444. 1753; Lay, Ann. Missouri Bot. Gard. **37**: 378, fig. 12. 1950.

Triumfetta heterophylla Lam., Encycl. Méth. Bot. **3**: 420. 1789.

Triumfetta sinuosa Miq., Linnaea **22**: 466. 1849.

Triumfetta Hostmanni Miq., loc. cit. 466. 1849.

Triumfetta Berterii Turcz., Bull. Soc. Imp. Nat. Moscou **31**(1): 227. 1858.

Triumfetta Salzmanni Turcz., loc. cit. **31**(1): 229. 1858.

Triumfetta quinqueloba Turcz., loc. cit. **36**(1): 574. 1863.

Shrub ca. 0.60-2.50 m. high, the branches and inflorescence-axes ferruginous-pubescent. Leaves with a petiole ca. 2-8 cm. long or sometimes slightly more, ferruginous-arachnoid, the blade broadly ovate, sometimes pandurate, often 3- to 5-lobate, the lobe tips, at least the terminal, acuminate, ca. 8-10 cm. long and 7-9 cm. wide, the margins irregularly serrate, the serrations usually glandular, the upper surface pubescent, the lower one arachnoid to pubescent, 3- to 5-palminerved, the nervation slightly prominent beneath. Inflorescences axillary, the cymes of 2, rarely 3 cymules, generally condensed, the bracts ovate to more or less elliptic, rarely obscurely 3-lobate, the peduncles and pedicels short, 1-2 mm. long, sparsely hirsute. Flowers 4.5-5.5 mm. long, hermaphrodite, the sepals 5, narrowly oblong, acute, with a very short apical appendage ca. 0.5 mm. long, ca. 4.5-5.5 mm. long and 0.5 mm. wide, fleshy, sparsely hirsute without, glabrous within; petals absent; gonophore and urceolus obsolete, the glands absent; stamens (5-)10(-15), the filaments ca. 3-4 mm. long, glabrous, the anthers ca. 0.5 mm. long; ovary suborbicular, ca. 0.6-0.8 mm. in diam., covered with numerous uncinat spinules; style ca. 3-3.5 mm. long, the stigma obscurely 2- to 3-parted. Fruit broadly elliptic, the body 3-4 mm. long and 2.5-3 mm. broad, lightly stellate-pubescent, the spines about 50, ca. 1.8-2 mm. long, retrorsely pilosulose, the spinules uncinat, 2- or 3-celled, each cell 1-seeded; seeds pyriform, ca. 1.5-2 mm. long and 1-1.5 mm. wide.

Common throughout tropical America; usually in dry open habitats, often in secondary formations; known as *cadillo* and *cepa de caballo*.

BOCAS DEL TORO: Changuinola Valley, *Dunlap* 122, 372, 433; vicinity of Chiriquí Lagoon, Old Bank Island, *von Wedel* 1883, 1949, 2005; Water Valley, *von Wedel* 1710, 1779, 1825, 1847, 1854; Darkland, *von Wedel* 2618. CANAL ZONE: Chagres, *Fendler* 172; vicinity of Fort Sherman, *Standley* 30993; near Fort Randolph, *Standley* 28638; Mount Hope Cemetery, *Standley* 28828; Gatun, *Bro. Heriberto* 124, *Hayes* 370, 991; hills west of the Canal, near Gatun, *Standley* 27275; around the Agua Clara Reservoir, near Gatun, alt. 20-30 m., *Maxon* 4660; Barro Colorado Island, *Shattuck* 657, 728, *Wetmore & Abbe* 88, 174, *Wilson* 41, *Wood-*

worth & Vestal 627; Frijoles, Standley 27638; Darien Station, Standley 31523; Gamboa, Standley 28533; Obispo, Standley 31735; Summit, Standley 26941; around Culebra, alt. 50-150 m., Pittier 2145; vicinity of Miraflores Lake, P. White 279; Corozal, Standley 27392; vicinity of Corozal, Piper 5302, 5308; Ancon Hill, 600 ft., R. S. Williams 21; Balboa, Standley 27124, 32110. COCLÉ: Aguadulce, near sea level, Pittier 4961; El Valle de Antón, trails near Finca Tomas Arias, 600 m., Allen 4229. COLÓN: between France Field, Canal Zone and Catival, Standley 30242, 30423; Rio Viejo, vicinity of Puerto Pilon, 10 m., Allen 4100; Juan Mina plantation, Río Chagres, Region above Gamboa, 25 m., Allen 4125. DARIEN: trail between Caná and Boca de Cupe, vicinity of El Real, along road to Río Pirre, Stern, Chambers, Dwyer, Ebinger 610; locality unknown, Macbride 2686. HERRERA: vicinity of Ocu, 100 m., Allen 4056. PANAMA: vicinity of San Carlos, alt. 0-10 m., Allen 1138; between Capira and Potrero, 80-130 m., Dodge & Hunter 8626; along the Corozal Road, near Panama, Standley 26792; Sabanas northeast of Panama City, Bro. Paul 184; Paitilla, Bro. Heriberto 236; Punta Paitilla, Standley 30805; Bella Vista, Standley 25339; Agricultural Experiment Station at Matias Hernández, Pittier 6926; Río Tapía, Standley 26126, 28057; near the big swamp east of the Río Tocumen, Standley 26698; Tocumen area, Dwyer 4884; Brujas, Mell s.n.; Taboga Island, Standley 27043, 27989. VERAGUAS: vicinity of Santiago, alt. ca. 50 m., Allen 1084. PROVINCE UNKNOWN: Carleton 122, Hayes 321.

9. DICRASPIDIA Standley

DICRASPIDIA Standley, Field Mus. Nat. Hist., Bot. Ser. 4: 226. 1929.

Shrubs or small trees, the pubescence of simple and stellate hairs, often also with gland-tipped hairs. *Leaves* alternate, petiolate, 2-stipulate, the stipules intra-axillary, persistent, unequal, one filiform, the other large, peltate and foliaceous, the blade dentate, palminerved. *Flowers* supra-axillary, solitary, large, hermaphrodite, actinomorphic, long-pedicellate, 5-merous; calyx subepigynous, valvate, the sepals provided along the margins and at the apex with long filiform appendages, persistent; corolla subepigynous, the petals free, longer than the calyx, glandless; stamens numerous, all fertile, subepigynous, free, the filaments short and filiform, the anthers 2-thecae, basifixus, versatile, longitudinally dehiscent from the apex to the base; ovary subinferior to inferior, 10- to 12-celled (probably initially 5-celled, but irregularly divided by false partitions), the cells many-ovulate; style simple, thick and short; stigma 5-dentate. *Fruit* baccate, surmounted by the persistent sepals, indehiscent, the epicarp thin; seeds, numerous, small.

A neotropical, monotypic genus, occurring only in Honduras, Costa Rica and Panama. This genus is easy to recognize by the characteristic leaflike, peltate stipules, by the numerous, long, filiform appendages of the calyx and by the position of the ovary which is almost inferior. The affinity of this genus to other members of the family is obscure.

1. DICRASPIDIA DONNELL-SMITHII Standley, Field Mus. Nat. Hist., Bot. Ser. 4: 227. 1929.—Fig. 9.

Shrub or small tree 3-10 m. high, the bark smooth, the branches whitish-tomentose and long-hirsute. *Leaves* rather short-petiolate, the petiole terete, 1-1.5 cm. long, whitish-tomentose and long-hirsute, the stipules unequal, one filiform and 1-1.2 cm. long, the other foliaceous, peltate, very short and eccentrically stipitate, suborbicular, up to 4.5 cm. in diam., sparsely pilose above and whitish-tomentose beneath; blade oblong to oblong-subobovate, somewhat asymmetric and slightly



Figure 9. *DICRASPIDIA DONNELL-SMITHII* Standley: A, leaves and stipules ($\times \frac{2}{3}$); B, flower ($\times \frac{2}{3}$); C, anther ($\times 1\frac{1}{3}$); D, longitudinal section of ovary ($\times 1\frac{1}{3}$); E, fruit surmounted by the persistent calyx ($\times \frac{2}{3}$).

cordate at the base, acuminate at the apex, 10-20 cm. long and 3-8 cm. wide, membranous, the margins very irregularly dentate, the teeth acute to more or less blunt, the upper surface dark green and sparsely pilose, the lower surface whitish-tomentose, 5- to 7-palminerved, the nervation prominent beneath. *Flowers* long-pedicellate, the pedicel slender, 4.5-5 cm. long, tomentose and long-hirsute; receptacle ca. 0.8 cm. in diam., tomentellous and long-hirsute; sepals triangular-acuminate, 1-1.6 cm. long (without apical appendages) and 0.5-0.7 cm. wide at the base, tomentose and hirsute outside, densely sericeous inside, each margin provided with 4-5 filiform appendages ca. 0.7-1 cm. long, the apical appendage ca. 1-1.2 cm. long; petals obovate, irregularly and bluntly dentate, 3-4 cm. long and up to 2.8-3.5 cm. wide, thin-membranous, bright yellow, glabrous; stamens with unequal filaments, ca. 0.3-0.7 cm. long, glabrous, the anthers oblong, ca. 1.2-1.5 mm. long; ovary densely villous-arachnoid at the apex, the style thick, enlarged at the base, ca. 0.8 cm. long and 0.25 cm. broad at the base, arachnoid on the lower part, the stigma 5-dentate. *Fruit* baccate, transversely elliptic, ca. 1 cm. long and 1.5-1.8 cm. broad, hirsute-arachnoid; seeds ca. 0.4-0.5 mm. long.

In second growth and along streams.

BOCAS DEL TORO: banks of Changuinola River, *Dunlap* 439 (type); lower Changuinola River, *Stork* 286.

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FLORA OF PANAMA¹

Part VI

FAMILY 116. BOMBACACEAE²

By ANDRÉ ROBYNS³

Trees, infrequently shrubs, mucilaginous, armed or unarmed, glabrous or lepidote, or with stellate, tufted, or even simple hairs. *Leaves* alternate, simple or compound-digitate, stipulate, the stipules fugacious. *Inflorescences* cymose or racemose or flowers solitary, sometimes cauliflorous. *Flowers* often bracteolate, small or large, hermaphrodite, seldom imperfect, actinomorphic, rarely more or less zygomorphic, usually 5-merous, with or without epicalyx; receptacle glandular or not; calyx valvate, lobate or truncate, caducous, persistent or accrescent; petals none or 5, contorted, usually adnate to the base of the staminal column; stamens 5 to numerous, usually monadelphous, rarely free; anthers 1- to 2- to many-thecate, free or coherent, hippocrepiform to linear, sometimes anfractuose, usually longitudinally dehiscent, rarely porose; pollen porate, colpate or colporate, with reticulate sexine, provided or not with supratragellar elements or with tegillate and spinulate sexine; staminodes infrequently present; gynoecium with 2-5(-6) or 10(-15) syncarpous carpels; ovary superior, sometimes subinferior, 2- to 5(-6)- or 10(-15)-celled, with (1-)2-many ovules in each cell and with axile placentation; ovules anatropous; style simple; stigma capitate or divided. *Fruit* capsular, smooth or sometimes spinose or samaroid, usually opening by 3 or 5 valves, sometimes more or less long-lanate within, infrequently pulpy and indehiscent; seeds glabrous, sometimes alate or arillate, often oleaginous; albumen generally none or scant; embryo usually curved, sometimes straight; cotyledons epigeal, plane or folded, foliaceous or carnose.

A pantropical family of about 26 genera, particularly well developed in tropical America; nine genera are represented in Panama. The capsules of some genera (*Bombax* L., *Ceiba*, *Ochroma*) are filled with wooly fibers, commonly named kapok; *Adansonia* L., *Bombacopsis*, *Durio* Adans. and *Pachira* have edible seeds; and the genus *Ochroma* furnishes the well-known balsa wood.

- a. Leaves compound-digitate; capsule loculicidally dehiscent.
 - b. Seeds not winged.
 - c. Staminal column divided into many filaments, each bearing a single anther, these hippocrepiform to oblong-linear.

1. The Flora of Panama by Robert E. Woodson, Jr. and Robert W. Schery and Collaborators should be cited as: Ann. Missouri Bot. Gard., with volume number, pagination and date of the Annals.

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- d. Leaflets inarticulate; capsule densely long-lanate within1. PSEUDOBOMBAX
- dd. Leaflets articulate.
 - e. Deciduous trees; capsule densely long-lanate within; seeds numerous, 0.4-1 cm. long and 0.35-0.95 cm. wide.....2. BOMBACOPSIS
 - ee. Evergreen trees; capsule silky-villous within; seeds few, 2-3.2 cm. x 2.2-6 cm. x 2-2.2 cm.3. PACHIRA
- cc. Staminal column divided into 5 filaments, each bearing 2-3 anfractuose anthers or 2 superposed, linear and slightly flexuose anthers...4. CEIBA
- bb. Seeds broadly winged; stamens 5, the staminal column long, the anthers almost sessile, elongated, spirally twisted, vermiform5. GYRANTHERA
- aa. Leaves simple.
 - f. Capsule indehiscent.
 - g. Staminal column separating into many pentadelphous filaments, each bearing a single anther; ovary superior; capsule with 5 membranous wings much enlarged laterally6. CAVANILLESIA
 - gg. Staminal column undivided or shortly 5-dentate to 5-lobate, the anthers sessile to subsessile; ovary subinferior; capsule not winged7. QUARARIBEA
 - ff. Capsule loculicidally dehiscent.
 - h. Flowers small, up to 1.8 cm. long, either hermaphrodite or staminate; staminal column divided into many unequal filaments, each bearing a single anther; ovary and capsule 3-celled; capsule glabrous or nearly so within; seeds arillate8. HAMPEA
 - hh. Flowers large, up to 11-15 cm. long, hermaphrodite; staminal column shallowly 5-lobate, antheriferous from about the middle to the apex, the anthers sessile; ovary and capsule 5-celled; capsule densely lanate within; seeds not arillate9. OCHROMA

1. PSEUDOBOMBAX Dugand

PSEUDOBOMBAX Dugand, *Caldasia* **2**: 65. 1943.

Trees or sometimes shrubs, deciduous, mostly unarmed, the trunk straight or spindle-shaped, the young branches generally whitish-pruinose. *Leaves* petiolate, compound-digitate or seldom simple; digitate leaves 3- to 9(-11)-foliolate, the leaflets inarticulate, sessile or petiolulate and entire; simple leaves with inarticulate and entire blade. *Inflorescences* cymose, the cymes 2- to 5-flowered, unipared or not, or flowers solitary. *Flowers* hermaphrodite, actinomorphic, pedicellate, 3-bracteolate, the bracteoles fugacious or not; receptacle mostly glandular; calyx cupuliform, campanulate or subtubiform, truncate to shortly 5-lobate, coriaceous, accrescent; petals 5, adnate to the base of the staminal column, fleshy, with tufted hairs, fugacious; stamens 150-1,500, apparently 1-whorled, the staminal column divided into many filaments or into 5-10 or 15 distinct phalanges, the anthers 1-thecate, hippocrepiform, medifixus, extrorse, longitudinally dehiscent; pollen colpate or colporate, the sexine reticulate; ovary superior, sessile, 5(-6-8)-celled, the cells many-ovulate, the ovules inserted on a central columella; style filiform; stigma capitate or 5(-6-8)-lobulate. *Capsules* subligneous, loculicidally 5(-6-8)-valvate, the central columella winged and persistent; seeds numerous, small, pyriform, imbedded in copious whitish to reddish kapok; cotyledons epigeal and expanded above the ground level, opposite, petiolate, equal, folded, foliaceous to slightly coriaceous, the primordial leaves simple.

A neotropical genus of 20 species of which only one occurs in Panama.